PRICE 50 CENTS

American Machinist

JANUARY 4, 1954

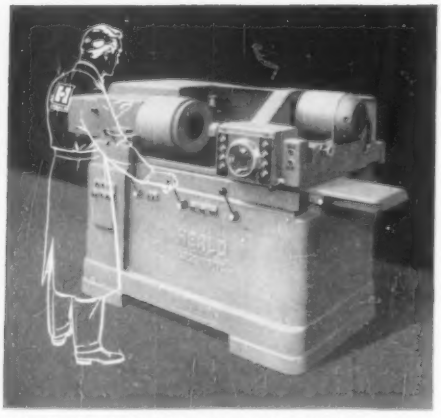
McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

Lathe beds torch-hardened — see page 2

Tool Rake Set by Hollow-Grinding Clamped Bit

High-Speed Trepanning — A SPECIAL REPORT

Heald Internal outproduces older equipment by nearly



This Heald Model 271 Gage-Matic grinds ring gear bores nearly as fast as two older machines.

THIS might be just another case history, except for one thing — a production increase of almost 100 per cent. And that's a pretty important saving in any production man's language.

A Heald Model 271 Gage-Matic was installed by an automotive manufacturer for grinding the bore of differential ring gears. A simple, straightforward operation — yet it was found that this new Internal out-produced *two* older machines by almost two-to-one! Why? Because all of the new Heald machines have been designed to save time and effort on *every phase* of the operating cycle. It all adds up to a substantial increase in production efficiency.

Remember — when it comes to precision finishing, it pays to come to Heald.

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and Bore-Matics

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chips

FLAME HARDENER . . . Monarch Machine Tool Co some time ago undertook an extensive development program on hardening of lathe bedways. The result was design and construction of the special machine shown on our cover. It is 60 ft long, capable of handling the bedways of any length Monarch lathe. Six torches harden both vees and both flats simultaneously in a single pass, attaining hardening to a depth of more than ⅛ in. and a Scleroscope reading of 70 to 72 Shore. A moving carriage carries the bed along at controlled speed, through the flame and a "water-wall" quench directly behind it. Such process elements as gas pressure, torch positions, carriage speed, and quenching conditions are coordinated for each size and type of bed to insure accurate control.

VERSATILE BRAKE . . . Notching and piercing work can be done economically on a press brake if it is equipped with small-area diesets, standard commercial piercing or notching units. Progressive operations can be set up on the press brake, and several operators used. Work passes from hand to hand, process interruptions are avoided, as well as trucking the work from machine to machine. The system is good for continuous or jobbing work and fewer operators are actually used than if conventional punch-press operations are set up. Second in the series by J M Matthewman, works manager, Canada Foundries and Forgings Ltd, James Smart Plant, Brockville, Ont.

TREPANNING . . . Bethlehem Steel has gone a longe way with high-speed trepanning of deep holes. Our current Special Report reviews development there, gives present ideas and conclusions. Speeds, feeds, tools, cutting fluids, and equipment are all described.

PADUCAH . . . F H McGraw Co built the AEC installation at Paducah. In the process, a number of special steel-fabricating machines were used, mostly in cutting, shaping, and welding pipe. We give you four pages of pictures of the more unusual ones.

GUN DRILL . . . Hartford Machine Screw Co has converted a No. O B & S screw machine for high-speed gun drilling, with a tremendous increase in production. A page tells you how it was done.

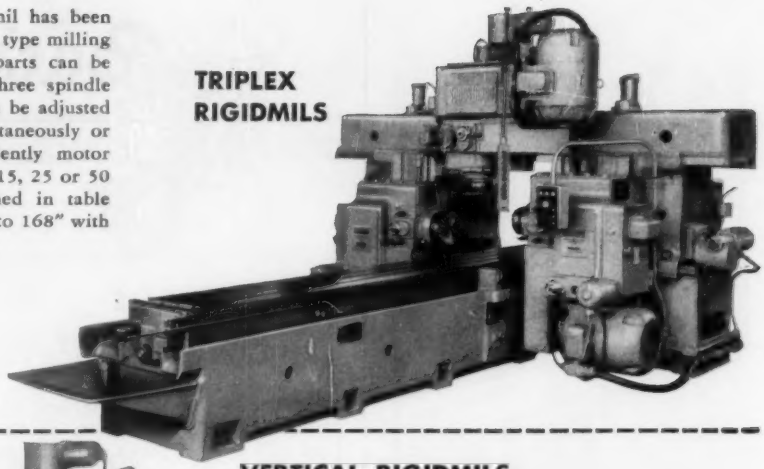
HOLLOW GROUND . . . Clamp-type tools usually hold the bit so grinding of clearances is not necessary—but only negative rake angles are possible. But, up to now, such tools have had no special treatment of the cutting face, beyond provision for chip breakers. Now Matt Aljanich, Supt of Tool Cribs at Caterpillar, shows how inserts can be hollow-ground to attain positive cutting angles, thus broadening applications on older machines (particularly multi-tool automatics). The change improves sizing, avoids burrs, steps up cutting rate 25 to 30% on new machine tools.

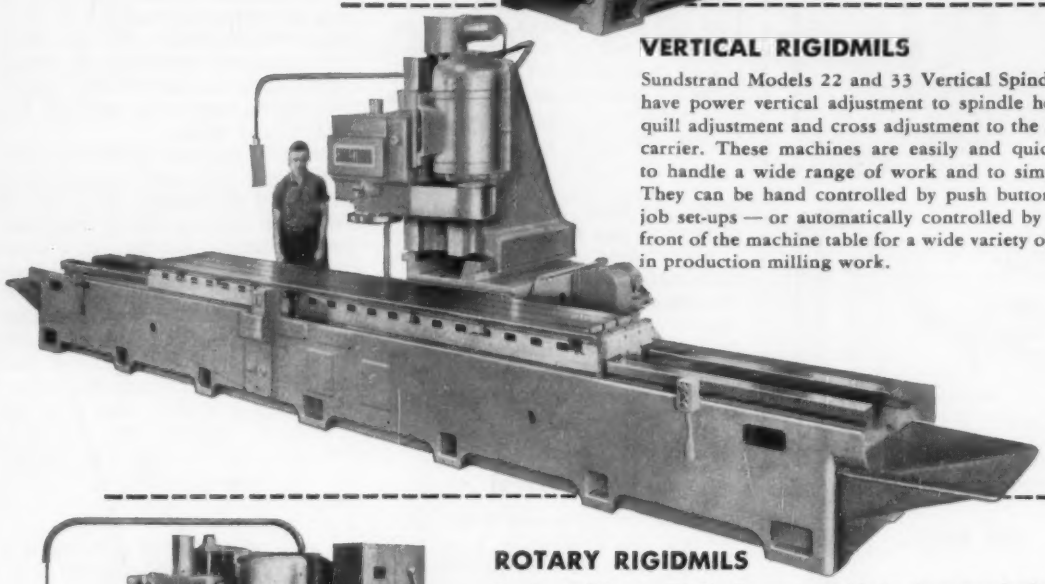
COMING . . . *AM* for Jan 18 will be our Annual Production Preview, and will set a record. It is our annual classified republication of descriptions of new shop equipment, materials, and parts—a picture-and-caption catalog of what's new. Thus it is obviously something to be hung onto for dear life, particularly this year—for it will describe about 1800 items, 20% more than in any previous one. Watch for it.

BRAKEMAN . . . J M Matthewman is author of our current series on press brakes, and is an engineer with varied experience. He learned tire building with Firestone Tire & Rubber, rock mining with International Nickel of Canada, plant management during the war at an ammunition factory, machining with The Steel Co of Canada, and is now managing the Canadian Foundries & Forgings, Ltd, plant at Brockville, Ontario. Mr Matthewman has adapted high-speed photography for observing the flight of gun projectiles, and applied induction Cyclograph inspection to heat-treated metal parts.

TRIPLEX RIGIDMILS

This highly productive Sundstrand Rigidmil has been developed to add flexibility to a production type milling machine so that both wide and narrow parts can be machined without sacrifice in accuracy. Three spindle heads, one vertical and two horizontal, can be adjusted to mill three sides of a work piece simultaneously or operate individually. Heads are independently motor driven and each can be furnished in either 15, 25 or 50 H.P. capacities. Machines can be furnished in table widths of 24" and 30" and feed strokes up to 168" with larger or special sizes available on request.





VERTICAL RIGIDMILS

Sundstrand Models 22 and 33 Vertical Spindle Rigidmils have power vertical adjustment to spindle head, endwise quill adjustment and cross adjustment to the spindle head carrier. These machines are easily and quickly adjusted to handle a wide range of work and to simplify set-ups. They can be hand controlled by push buttons for single job set-ups — or automatically controlled by dogs on the front of the machine table for a wide variety of table cycles in production milling work.

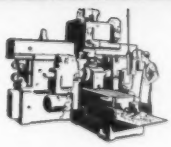
ROTARY RIGIDMILS

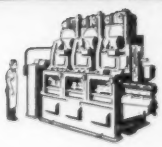
Sundstrand Rotary Rigidmils are available in three standard sizes with 36" and 48" diameter tables. They have way type cross adjustment of the spindle head carrier and way type vertical adjustment to the spindle head to provide maximum cutter support for either large or small parts. The adjustable swinging pendant permits easy access to the machine controls from any operating position. Power adjustment is optional for both the spindle head and the spindle head carrier.

Free Data

Free Data on each of these Sundstrand Rigidmils is available on request. Complete specifications are included. Ask for bulletin No. 139.

TRIPLEX RIGIDMILS | SPECIAL MACHINES





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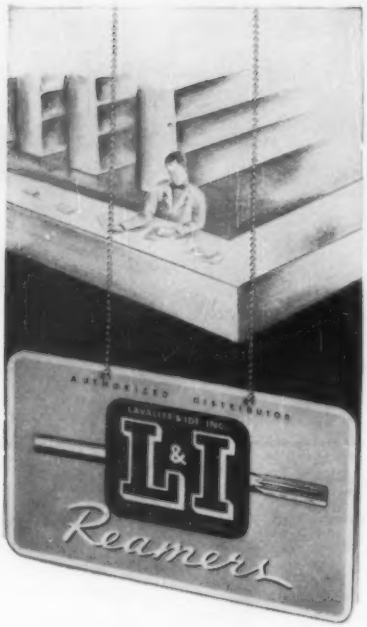

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LAVALLEE & IDE, INC.
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Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Dead End

On a recent trip to Germany I saw some interesting machines that I am sure would sell well in the US. I have a few thousand dollars and would like to import them, because I am sure I could make a tidy profit. Could you tell me how to go about selling machine tools? I have a big garage I could show the machines in, but don't know how to get people to come and look at them.

A SCHWARTZ
Indianapolis

Forget the idea! You can't sell machine tools like holding a cake sale. The first thing would be to survey the market and see how the machines compare with those already available. Then you would have to advertise nationally, hire experienced sales engineers, and be prepared to give complete service, including a supply of spare parts.—ED.

No Rebuttal

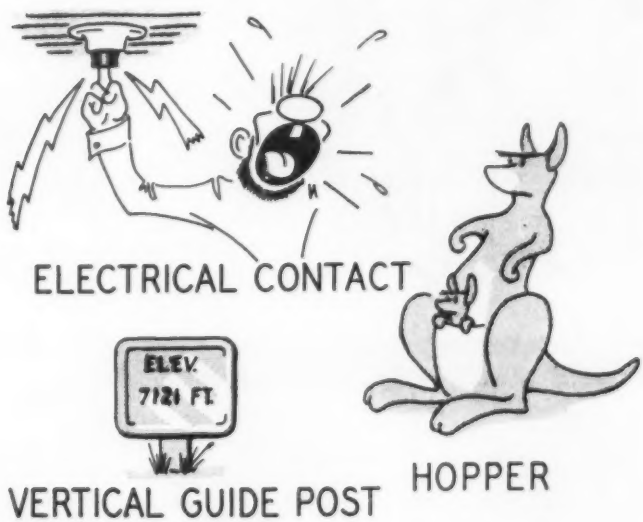
Referring to my recent letter (*AM*—Aug 3 '53, p132) may I say that the answers were well done and informative but, I feel, evaded some of the issues involved. For example, there was no rebuttal of my statement that they were not applying modern stress analysis methods in designing some components. There also were no statements refuting mine on the superior surface finish produced by a belt-driven lathe, or on the problems of vision, generated heat, and deflections due to tool pressure. We have also found that lathes produced to NMTBA toolroom standards do not have lead or cross-feed screws sufficiently accurate for some of our work.

Actually, the finest precision lathe I have ever seen was a South Bend lathe used to produce parts for a diffraction grating ruling machine. The headstock bearings had been reworked for as nearly as perfect a fit as possible, both the lead screw and cross-feed screw carefully lapped, and the half-nuts carefully fitted. The bed was replaned and scraped in to extremely low tolerances. All elements were then reassembled, aligned, and adjusted. The lathe, when ready, was capable of easily holding tolerances less than ten per cent of the NMTBA toolroom lathe specifications.

I will readily grant that this is a special application, but it does serve

GRINETICS

By D G SMITH



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SPOT NEWS of Metalworking

- **A 28% price reduction is involved in a $1.5 million 81-mm shell contract** awarded to Cleveland Welding Co, which will receive that much less than it did for its first shell orders, produced in May 1952.

- **West Coast aircraft 1953 labor negotiations wound up largely on company terms.** Hourly wage boosts in four companies averaged around 9-10 cents, as against union demands for up to 26 cents. But the unions did pretty well on fringe benefits: cost-of-living bonus; six guaranteed paid holidays, longer vacations.

- **Symposium on Automatic Production of Electronic Equipment** is scheduled by the Air Force and Stanford Research Institute for April 19-20 in San Francisco.

Ford is estimated to have spent upwards of $60 million to tool up its new 130-hp overhead valve Y-block V-8 engine. Cost includes a new plant and more than 2000 machine tools. Add to this five years of designing, experimenting, testing, and hand-building some 30 or more engines at $25,000 apiece—the cost is astronomical.

- **Small Business Administration has granted a direct loan of $55.000** to W J Dunn & Co, South Boston, Mass, manufacturer of drop forgings and mining tools. Loan is to provide working capital for defense production.

- **Fireproof roof deck material impressed Detroit manufacturers** at a recent demonstration — two-unit structure burned at 1850 F max for 15 minutes. Exposed material neither flamed nor smoldered; slabs charred to only ⅜-in. deep; ice, snow and asphalt on the roof didn't even melt. Roof could still support a man.

- **Japan will hold an industrial machinery fair in Pakistan February 10,** plans to hold another in Lyallpur, West Punjab, soon.

- **Thin ceramic shell for investment casting of titanium aircraft parts** has been developed at Battelle Memorial Institute, Columbus, Ohio.

- **A German metalworking firm has been licensed to use the Koldflo process** for cold-extruding steel. Germany's Kabel und Metalwerke, Nuernberg, has also been authorized to sub-license the process to other Western European firms.

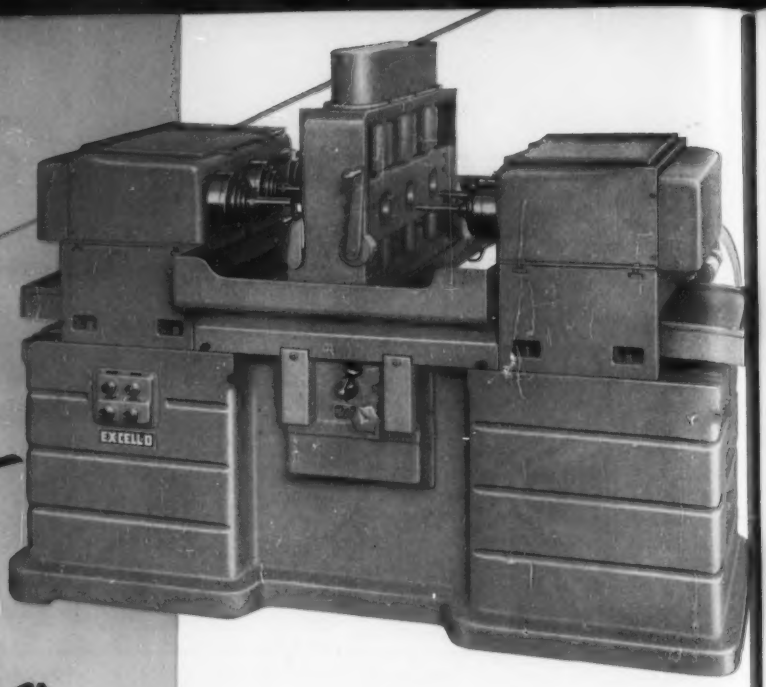
- **Average monthly labor turnover at Boeing Airplane Co has dropped sharply** — from 11% in 1942 to 3% in 1953. November's turnover: 1.8%.

- **Trend of the times:** shop costs are being cut by use of steels that are easier to machine. These steels have been in short supply until recently.

New titanium production goals call for 35,000 tons per year by 1956 instead of the current 25,000-tons-per-year goal. And production will be concentrated in only five or so companies. These firms will get cash advances against future production, fast tax write-offs on new plants, market guarantees. Leading candidates for the new contracts are Titanium Metals Corp, DuPont, and Monsanto. Titanium Metals and DuPont already have contracts to produce about 3600 tons each. Crane Co has a contract for 6000 tons per year.

- **Many small West Coast aircraft parts shops are exploring new fields** to take up the slack from a shrinking defense program. Artisan Mfg Co, Los Angeles, is retooling to make outdoor furniture, for instance. These attempts at diversification are expected to reduce the casualty rate compared with the period right after World War II.

Style 17 Ex-Cell-O Precision Boring Machine equipped with new, inbuilt motor spindles for semifinish and finish-boring of wrist pin holes in automotive pistons.



Vibration-Free Boring

NEW INBUILT-MOTOR SPINDLES ON EX-CELL-O PRECISION BORING MACHINE ASSURE FAST, ACCURATE FINISHING OF PISTON PIN HOLES

Wrist pin holes in automotive pistons are given exceptionally fine surface finish by this Style 17 Precision Boring Machine equipped with inbuilt-motor spindles. Diameters are held within .0003" total tolerance. The inbuilt motor positively eliminates any vibration that might originate in belts and pulleys.

The thin walled parts are held firmly, yet without distortion in a fixture which provides perfect alignment for bores through both bosses. Interchangeable locators are provided to accommodate two sizes of pistons. This machine both semifinishes and finish-bores the pin holes. Production rate is high.

For further information on the many uses to be made of Ex-Cell-O Precision Boring Machines, see your local Ex-Cell-O representative or write today for Bulletin 31205.

The machine table feeds to the left for semifinish-boring, then to the right for finish-boring, assuring uniform stock removal for the finishing cut. New inbuilt-motor precision boring spindles are rigid and smooth running. Coolant is manifolded through the covers on both sides of the pistons.

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS CUTTING TOOLS • RAILROAD PINS AND BUSHINGS DRILL JIG BUSHINGS • DAIRY EQUIPMENT AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS

53-21

Washington

The Pentagon has taken the wraps off a consolidated procurement listing of what each service buys and where. It lists 37 broad classes of hard goods, excluding weapons. Included are 11 types of machine tools and 11 types of other metalworking machines.

You can get a copy of the listing, "Purchased Items and Purchasing Locations of the Defense Department," (and a companion booklet, "How to Sell to the Defense Department") from any Army, Navy, or Air Force procurement office. You can also write to the Pentagon, Washington 25, DC. The listing is a result of the top-level inquiry into Defense Department procurement practices, which Secretary Wilson ordered soon after he took office.

Another result of the inquiry: in the future, you can expect a simplification of bidding procedures and forms. One purchasing agency has already eliminated the requirement that recognized companies file current balance sheets with each new bid. If this works out well, it's a good bet that the measure will be extended to the broad spectrum of defense purchasing agencies.

• • •

In deference to the Justice Department's Anti-Trust Division, Commerce Secretary Weeks has watered down his proposal to set up "Industry Advisory Councils" in his department. He's organizing informal "Industry Conferences" instead.

The councils would have been patterned after the Interior Department's National Petroleum Council — with more stature and authority than Commerce's present "Industry Advisory Committees." The IAC's were set up under the Defense Production Act, are organized on narrow product lines for the most part, and are advisory groups on defense matters only.

The councils would have been organized on broader industry lines, and would have had paid staffs and industry chairmen, would have initiated reports and studies, and advised on general fields like taxes, labor relations, and other matters outside Commerce's jurisdiction.

The new "Industry Conferences" will combine some features of both. They will be informal advisory groups on "broad-gage policies and the general economy," but will have government chairmen and no fixed memberships. Secretary Weeks plans to keep the IAC's on the books, however, for mobilization and defense consultation when necessary.

• • •

Next month, the first two "Mariner"-class fast freighters — the big, 22-knot vessels planned as the Liberty ships of a new war — come back to the Maritime Administration for mothballing. Twenty of these have been built, 15 are still on the way.

Private ship operators are turning down purchase of the Mariners. The ships are too big, too fast, and draw too much water to operate economically, the shippers charge. It's a case of the government giving the industry more than it wants or needs, and the ship operators are backing off. Result is that the government is likely to be stuck with $350 million worth of brand new ships to be mothballed.

Eisenhower promised a strong merchant marine and a positive government policy for the merchant service while he was campaigning. But so far, the industry thinks it's the administration's stepchild. Merchant marine employment — in ship operation, ship building, and ship repair — has been steadily dropping since March 1952, and is likely to wind up less than the pre-World War II figure within the next 18 months. It's already less than the Korean peak.

One or two operators, however, may soon reverse the trend on the Mariners. The Pacific Far East Line, for example, loves the Mariners, and would like to buy them. Report is that the Seattle Line will take three or four of the ships if it can get them at less than $6 million per.

• • •

FTC is back in the controversy over battery additives. The agency held up its investigation of false and misleading advertising claims by additive makers when the fight involving the Bureau of Standards began.

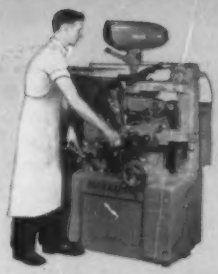
While FTC's reinstituted investigation of AD-X2 may not bring concrete action for several months, its action on Sav-A-Battery, a similar material, is well along. FTC refused a request for additional tests on the latter additive. Instead, it told its hearing examiner to decide whether to issue a cease-and-desist order. He had earlier found Sav-A-Battery's advertising false and misleading, but FTC froze this when the Bureau of Standards' veracity was questioned. The Post Office has dropped fraud charges against AD-X2.

New peace pact between AFL's machinists and printing pressmen setting out press room jurisdiction raises hopes that battle for members and jobs within AFL can be settled amicably.

AFL committee plans to have new pact ready for meeting of Executive Council February 1. This will set up rules for all AFL Unions, including IAM and Metal Trades, to end all jurisdiction conflicts. But the pact will require extensive study by AFL affiliates, and it is not expected to become operative until next fall.

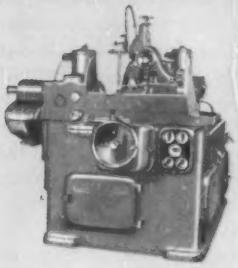
SHEFFIELD MACHINE TOOLS
guard *PRECISION* in the shop

Micro-form Grinder, Model 121 grinds high precision profiles both flat and circular directly from large scale drawing, saving up to 75% over conventional practice. ☐

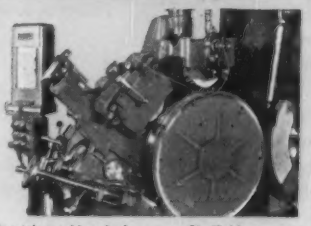


Micro-form Grinder, Model 122 equipped with a combination 30 power microscope and viewing screen. ☐

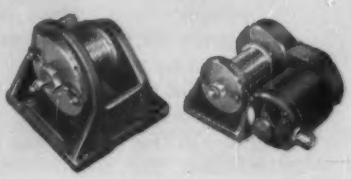
Thread and Form Grinder, Model 133 uses the multi-ribbed wheel principle to grind small precision threads and intricate forms on a high production basis. ☐



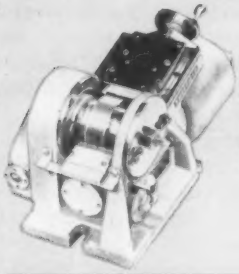
Precision Thread and Form Grinders —100 Series, produce precision threaded elements and cylindrical forms by the Crushtrue method, the diamond dressed multi-ribbed wheel or the single point wheel method. ☐



Special machine tools are a Sheffield specialty, such as this one of 12 jet turbine shroud grinders placed in operation within the last six months. ☐



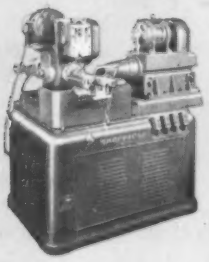
Idler and motorized type Crushtrue devices are available for forming grinding wheels on standard surface grinders. ☐



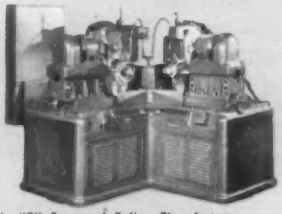
Self-truing Motorized Crushtrue Device forms surface grinder wheels for the grinding of flat form tools, etc. of the highest precision and uniformity. ☐

The Sheffield Crushtrue Roll Bank plan provides Rolls for production use while worn rolls are enroute to Sheffield for re-grinding and re-ground rolls are enroute from Sheffield for use. Nominal exchange charge. ☐

Gear and Spline De-burrers deburr or chamfer up to 600 gear teeth per minute. Applicable to spur, helical, hypoid, bevel and herringbone gears —also multi-start worms. ☐



Gear and Spline Chamfering Machines chamfer, burr or recess the ends of gear teeth at high production rates—ideal for short runs and quick changeover. ☐



Style "C" Gear and Spline Chamfering machines have two cutter spindles and two workheads for mass production gear manufacture. ☐

Sheffield is prepared to produce precision threaded elements and formed parts on contract to augment your own manufacturing facilities. ☐

CHECK THE BOX ☑ **for any piece of equipment or service in which you are interested. Tear this out, attach it to your letterhead, mail to Sheffield, and detailed engineering data will be forwarded.**

Machine Tool Division • The Sheffield Corporation
Dayton 1, Ohio, U. S. A.

MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

SHEFFIELD

6559

Detroit

If Chrysler's experience is symptomatic, an important segment of the public obviously is all for higher horsepower and plushier cars.

Production of 1954 New Yorkers and the more expensive New Yorker DeLuxes originally was scheduled on a 60-49 basis. The company reasoned that people wouldn't be spending as much money for cars this year as last.

Surprisingly, orders for the 235-hp & DeLuxe soon outran production, while demand for the 195-hp standard New Yorker was nowhere near as brisk as it was expected to be.

Early in December, schedules were revised so that seven DeLuxe models were produced for every three standard models. Within four days, stocks of interior and exterior trim used on the costlier models were depleted.

Immediate effect: a considerable number of workers were laid off, an action which drew a broadside of critical comment from CIO's auto workers. Chrysler announced it laid off about 7,300 workers. UAW contended that was on the short side, said 9200 layoffs occurred.

Further, UAW did not accept the corporation's explanation for the rescheduling. Instead, it said the layoffs were due to "reckless over-scheduling during the first half of 1953," went on to suggest that management "learn how to run its business in a humane and socially responsible manner."

• • •

The 1953 vehicle production count is in. By any standard, the year was a whopper, exceeding virtually all expectations.

Preliminary Automobile Manufacturers Assn estimates are that 6,165,000 cars and 1,205,000 trucks and buses were turned out by US plants. The 7,370,000 total is second only to 1950's 8-million units and represents a 33 per cent gain over 1952.

To see what auto industry writers think of 1954 prospects, AMA convassed reporters and came up with average estimates of 5,543,000 cars and 1,023,000 trucks and buses. Total: 6,566,000.

That would be a very substantial year, slightly more optimistic than many sales executives forecast. Interesting point: the writers' projections perennially are too low (average guess on total 1953 production, for instance, was 761,000 units shy of the mark). Using their past performances as guides, 1954 measures up as a 7-million year.

• • •

First-quarter production programming among the three largest producers could make hash of all estimates if the pace were duplicated through the balance of the year. For this quarter, Chevrolet is scheduling about 401,000 units, Ford about 396,000 and Plymouth about 189,000. During the same period last year, the respective figures were approximately 350,000, 247,000 and 160,000.

Fisher body has lumped together all its experimental and development work in plastics. The division has been doing developmental work in plastics for dies, jigs, fixtures, forms, molds and body-construction materials since 1946. Its engineers were scattered out, working on separate projects. Now they are centered in Detroit in what formerly was a foundry building.

Packard plans to introduce a plastic sports model soon. Ionia Mfg Co is hand-building four plastic bodies. Each will be full size, not ground-huggers like Chevrolet's corvette. First plastic Packard probably will be a convertible.

The company is entertaining no mass-production plans. Initial models will be used for publicity purposes, or as salesmen are prone to say, "to gage public reaction."

• • •

Michigan's skyhigh employment rates have dropped to a point not touched since the 1952 steel strike. In mid-December, about 85,000 workers in Detroit were unemployed. Statewide, an estimated 140,000 workers were jobless. Figures for both the city and state represent about 5% of the total work force in each area.

While a part of the total is attributable to model change-overs, cutbacks to allow dealers to clean out 1953 stocks and lingering effects of the Hydra-Matic fire, seasonal declines in the construction industry, food processing plants, elsewhere, also contribute to the total.

• • •

A slim chance that either Pontiac or Chevrolet or both will put V-8's in their 1954 models still exists, but rather than attempt a mid-year engine switch, with all its attendant problems, both more likely will introduce new engines in 1955.

Packard's 1955 V-8 program is well underway. This year, the company is sticking to its straight eight, but horsepower is up to an imposing 212.

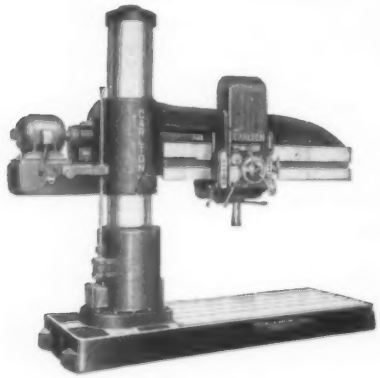
Lincoln probably will be ready by late summer to make first production runs on its new transmission, which is expected to be a larger version of Merc-O-Matic.

The 119-hp L-head 6 cylinder engine now powering Chrysler's Windsor DeLuxe will be replaced in 1955 with a V-8, although the company probably will continue to supply sixes for those few customers who refuse to change to an eight.

Though Plymouth has set aside no appropriation yet, current sepculation is that the company is planning to put a valve-in-head V-8 into production sometime in the future.

Only ONE can be called the Finest: Carlton

. . . here's another good reason why: low maintenance cost



CARLTON RADIAL DRILLS cost less to maintain because they are *designed for less maintenance attention.* For example: there's only *one* friction clutch to adjust. There are *no* tapered gibs to adjust because the head travels across the arm on hardened steel ways. Automatic lubrication throughout eliminates the damage and unnecessary wear that occurs in ordinary radial drills.

COMPARE CARLTON AND YOU'LL BUY CARLTON. Judge for yourself why Carlton radial drills are the first choice of American industry. Write for bulletins. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

Machine Tools

The American machine tool industry chalked up a new postwar record in 1953 by shipping about $1.2 billion of machine tools.

The total was slightly ahead of the volume the preceding year — $1,125,900,000.

Even after allowances are made for price advances, the expansion of the industry's output dollar-wise since Korea is very impressive.

Before the Korean outbreak, production was not much better than $300 million a year.

• • •

New orders placed during the past year are put at about $860 million.

But cancellations have been much heavier than usual and have cut sharply into backlogs.

The 1953 orders were down considerably from the level in 1952, when builders booked a total of $1,057,350,000.

The industry's shipments have been dipping recently. Output in October was around $103 million. November dropped down to about $95 million. It is doubtful whether December exceeded November though the final month of the year often proves surprisingly large.

• • •

Most of the subcontracting being done by the industry is at an end or close to it.

Only in a few cases will subcontracting be carried up to the second quarter of 1954 or longer.

Backlogs of orders are at little better than a six-months' average. And they are not evenly distributed throughout the industry.

Makers of highly special machines are comfortably booked through most or all of 1954. A small group of builders are fully engaged up into the early part of 1955. But they are the exception rather than the rule.

• • •

Elimination of the so-called critical list (Schedule D in NPA Order M-41) and the paring down of the required ratio of rated shipments to total shipments from 60% to 40% are in process of being formalized.

They have got bogged down in Washington red tape, however, and the effective date will be later than predicted in this column in the previous issue.

The proposed rewriting of three ODM orders, including the one governing the leasing of machine tools for civilian work, has struck a snag.

Top ODM people seem to feel that the leasing order is sacred and should not be touched.

• • •

Japan is attracting more attention from US machine tool builders than any other export market.

Some Japanese orders for US machines have been placed, but many more are to follow.

Frank Hayes, vice president of the Bullard Co, has just returned from Tokyo. His comments on the Japanese situation are on page 136.

Competition for business there is confined pretty much to American and German builders. One prominent British builder, just back from Japan, is said to believe that lack of sterling credit has put the British out of the running.

• • •

Formosan defense program is to get $400,000 more of US machine tools in addition to $1 million already procured.

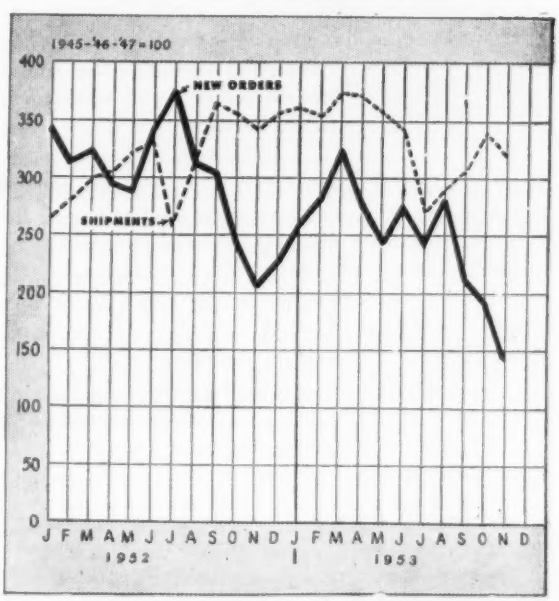
Italian machine tool builders would like to produce US machines on license. Foreign Operations Administration has a mission in Rome readying a program to promote this idea. It has talked with the Italian machine tool association (UCIMU) and the Italian Ministry of Industry.

Points made to US builders: Decreased dollar aid for purchase of US machines direct, ample skilled labor, low wages, good location for export to Middle and Far East.

BF

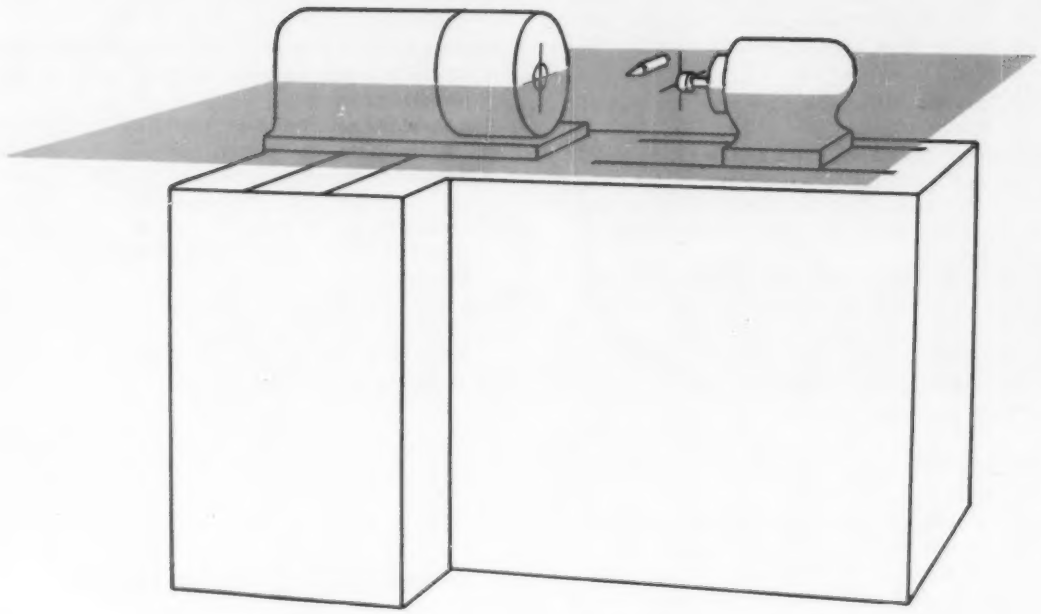
MACHINE TOOL INDEX
(1945-47 = 100)

(Source: National Machine Tool Builders' Assn.)



alignment

for better internal grinding



THE elements of an internal grinder that affect its alignment are the ways (longitudinal and transverse), the workhead and wheelhead, and the diamond. These elements should be set up to meet the following requirements:

1. The longitudinal ways must produce a straight line of motion and the transverse ways must also produce a straight line of motion.

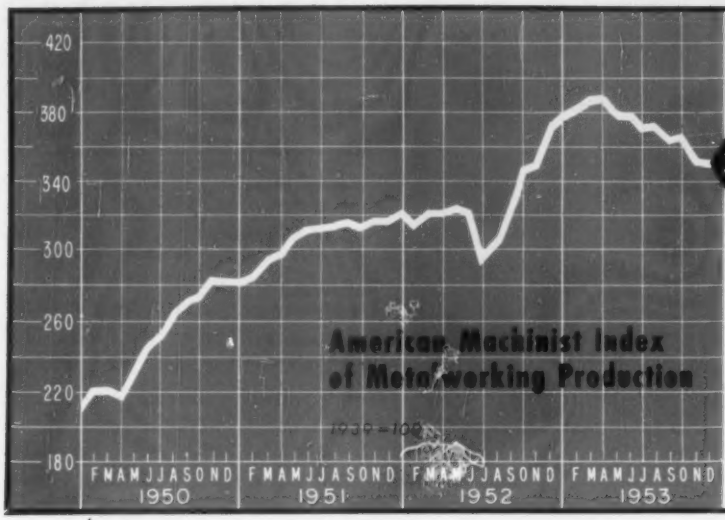
2. The workhead axis must lie in a plane parallel to the motion of the longitudinal ways.

3. The wheelhead axis must lie in the same plane as the workhead axis and be parallel to the motion of the longitudinal ways.

4. The diamond must lie in the plane established by the wheelhead axis and the workhead axis.

If these four requirements are met we will then have a straight line of contact between the grinding wheel and the work. This is the heart of the internal grinding process.

Gaging Metalworking



PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	DEC '53(*)	NOV '53(p)	OCT '53(r)	NOV '52
Tot. Index	**350**	**352**	**360**	**353**
Machinery	**312**	**319**		**320**
Electrical Machinery	**405**	**415**		**405**
Autos	**267**	**282**		**270**
Other Transportation	**605**	**606**		**573**
Other Metalworking	**351**	**355**		**353**

(*) Estimated (p) preliminary (r) revised

Metalworking took a breather during the Christmas holiday season. It was the first period of relaxation since the outbreak of Korea.

The year-end rush of the past two years was missing. The urgency of working overtime was gone.

Whatever measure you wished to apply — hours worked, shipments, sales — the total has been less than it was a year ago.

• • •

A trend of the times is the desire of metalworking companies to get their inventories down.

Steel mills in particular have been the victims of this trend. Users are working off tonnages acquired more rapidly than expected when the steel situation suddenly eased.

Independent finishing mills have been hit the hardest. Some of them have temporarily pared schedules to 50%-75% of capacity.

• • •

These adjustments though should not make one lose sight of the tremendous volume of business being done by Metalworking. Backlogs still are very high compared with "normal."

Defense work is being stretched out but is sufficiently potent to provide a lot of employment in many metalworking centers.

Many defense contractors, such as aircraft suppliers, declare that first quarter operations will closely parallel the fourth quarter, with no curtailment until the middle of 1954 or later.

• • •

American Machinist's Metalworking Production Index slid off in December to about 350 (with 1939 taken as 100). It is now 8% below the 1953 spring peak.

Production rate in various segments of Metalworking has not declined uniformly. The machinery component is down only 10% and the electrical machinery component even less. The big drop came in the automobiles, off 20%.

Transportation equipment, except automobiles, reflecting the situation principally in the aircraft industry, is still at the post-Korean peak.

• • •

Industrial machinery builders have lopped off some hours from shop schedules. And both sales and shipments are down, but not alarmingly.

Hundreds of automotive parts companies are pinning their first-quarter hopes on generous releases of delivery schedules from Detroit. These hopes are likely to be realized as automobile makers put into effect big production programs.

• • •

Outlook in electrical goods is bright. The two largest producers, General Electric and Westinghouse, have both predicted a very large year.

Farm implement companies regard the outlook as hazy. Sizable inventories of equipment, including tractors, are yet to be worked off.

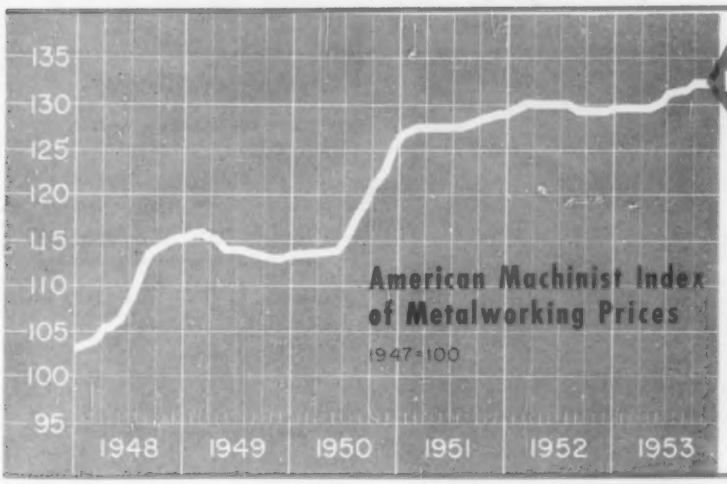
This means that production in the first quarter may be down 30% from the same quarter in '53.

Some farm implement makers are reported running at about half of capacity.

• • •

Employment in Metalworking is at a high level, but is sliding off. Most of the decline is in unskilled help. Skilled men can register for a job today and have one tomorrow. And engineers and other technicians continue to be in short supply and are being offered extra inducements.

Gaging Business



PRICE INDEX

	DEC '53(*)	NOV '53(p)	OCT '53(r)	NOV '52
Total Index	**132.6**	**132.6**	**132.5**	**129.5**
Metalworking Machinery	**141.8**	**141.7**		**137.8**
Other Machinery exc. Electrical	**137.3**	**137.1**		**132.2**
Electrical Machinery	**131.7**	**131.7**		**124.4**
Fabricated Metal Products	**128.9**	**128.9**		**128.0**

(*) Estimated (p) preliminary (r) revised

Metalworking Price Index has firmed up. Virtually no change has taken place in the Index since September. But from April to September the Index rose about 2%.

• • •

Number of workers on non-farm payrolls declined between October and November — this was mainly due to a continued downtrend in plant employment.

November's total non-farm employment dropped about 370,000 from October to 49.2 million.

Despite the Christmas store employment increase, November's total non-farm employment dropped because of a decline of 300,000 in manufacturing employment.

This contrasts sharply with an average (1947-1952) decline of about 50,000 between October and November. Employment cutbacks centered in the metalworking industries.

• • •

Factory production workweek in November averaged 39.9 hours. This was the first November in four years when the workweek failed to run over 40 hours.

Even so, a workweek as close as November's to 40 hours shows that a lot of overtime work is still being scheduled.

Gross hourly earnings averaged $1.78 in November — the same as in September and October. Over the year, hourly earnings were up 7 cents.

Factory hirings fell off in October and layoffs increased — continuing the trend in recent months. Factory hiring rate dropped from 40-per-1000-employees in September to 34-per-1000 in October.

This was a larger-than-normal decrease for this time of year and was about a third below the average for the month for previous post-war years. Most severe declines showed up in ordnance, primary metals, electrical machinery.

Layoff rate in manufacturing rose from 15-per-1000 employees in September to 18-per-1000 in October. Largest layoff increases were in food, ordnance, rubber and lumber.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-1925 = 100)*	243.8	244.8	247.5
Steel ingot operation (thousands of tons)	1,917	1,955	2,236
Electric power output (million Kilowatt hours)	8,661	8,582	8,140
Production of automobiles and trucks	108,834	123,148	121,590
Engineering construction awards (*Eng. News-Record* — millions)	$181.7	$655.1	$167.3

QUARTERLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production (1935-1939 = 100)*	228	231	234
Index of durable manufactures production (1935-1939 = 100)*	299	304	304
Durable goods manufacturers' sales, millions*	$12,155	$12,221	$11,968
Electrical machinery manufacturers' sales, millions*	$ 1,416	$ 1,550	$ 1,205
Other machinery manufacturers' sales, millions*	$ 1,986	$ 2,027	$ 2,068
Durable goods manufacturers' new orders, millions	$ 9,935	$ 9,896	$11,452
Electrical machinery manufacturers' new orders, millions	$ 1,295	$ 1,052	$ 1,324
General machinery manufacturers' new orders, millions	$ 1,747	$ 1,743	$ 1,926

* Seasonally adjusted

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Ready To Make The Most Of It?

With the advent of 1954, a weird business era has come to an end.

It was a time about which salesmen will dream happily the rest of their lives. "Used cars" sold for more than new ones. Steel customers took steel-mill sales managers to night spots to try to get more tonnage. You pulled wires just to secure delivery of products at the list price rather than to finagle a discount.

This rip-roaring seller's market lasted all of 13 years for many products, setting a new record. But let's face the fact that it is behind us.

What's ahead is not likely to make for relaxation. Metalworking management is confronted by a new set of conditions. The sooner it adjusts its policies to these conditions, the better it will be able to maintain a strong competitive position in a "selling market."

It is a time for putting all phases of your business under the microscope. Selling is going to be tougher, profit margins narrower and prices under closer scrutiny by buyers.

To begin with, what about your product? Is it the same as it was in 1947, let's say, or have you redesigned it to meet 1954 conditions? If you are dishing up the same old merchandise, you'd better get busy and develop a new model.

Remember that appearance as well as content of your product is more important than ever before. Proper packaging cannot be glossed over, whether you are making electric irons or machine tools.

Then what about your production costs? Have you let them run up in the past few years when the pressure was on for more and more production? How archaic are your machines and tools and manufacturing processes? When the heat is turned on to get shop costs down, how well equipped are you to deliver?

Don't forget that materials and production techniques have a lot to do with the cost factor. Are you up-to-date on the various metals that you might use?

How familiar are you with the newest in forging, stamping, die casting, machining?

Even if you have worked miracles up to this point and have the world's best product, you still have to sell it. And that is where the real fun begins.

The sales forces of many companies have been able to coast for a long time. Some of today's salesmen have never had to earn their way in a selling market. Up to now it has been largely a matter of parceling out the goodies to the customers.

From now on, things will be different. With that situation in mind, have you taken a look yet at your sales staff to see how adequate and ready it is to meet the conditions ahead? If you expect to get your share of the business, there will be no place on your selling force for the faint-hearted or the order-taker or the back-slapper.

Nineteen fifty-four will be a critical year. It will be critical because it will be transitional and a period of readjustment. All indications are that there will be lots of business done. But there won't be enough to keep everybody running full tilt. The orders will go to the companies that prepare themselves for the opportunity ahead and then make the most of it.

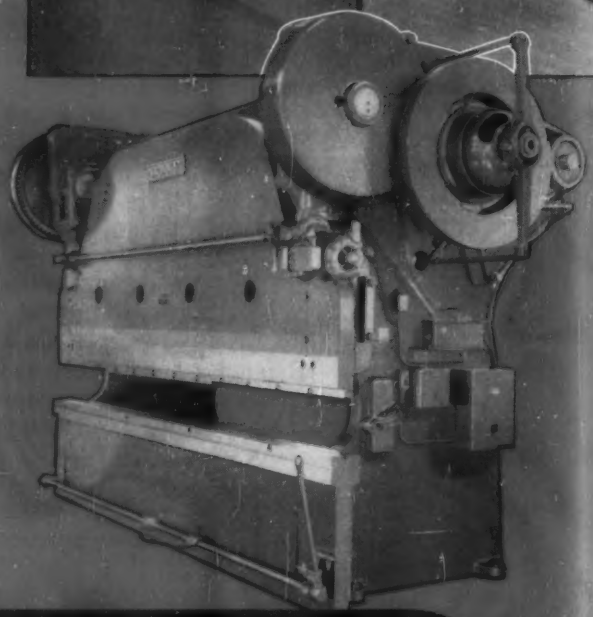
Burnham Finney

another accurate job...

ONE OF A LONG LIST

Bolted on angle brackets for bed and ram give wide die surfaces. Easily installed and removed they allow versatile Cincinnati Press Brakes to do press work. Here stiffeners for pontoons are being accurately formed—3 bends at each stroke. It is one of the many types of jobs handled economically on versatile Cincinnati Press Brakes.

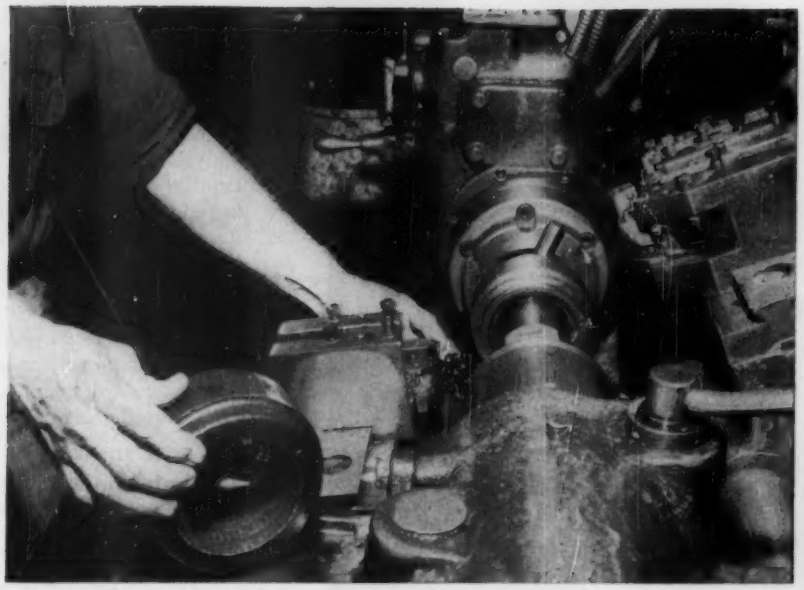
Write for the New 72 page Press Brake Catalog B-4.



CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES



HEAVIER CUTS AT INCREASED SPEEDS AND FEEDS were made possible on this multi-tool automatic lathe when hollow-ground solid carbide inserts were substituted for conventional flat-ground inserts in clamp-type holders. Zero or slightly positive rake angles are used

CATERPILLAR HOLLOW-GRINDS CLAMPED CARBIDE TIPS

METAL-BOND DIAMOND WHEELS hollow-grind the ends of triangular, square and round solid-carbide inserts for clamp-type toolholders, and grind chipbreaker ledges

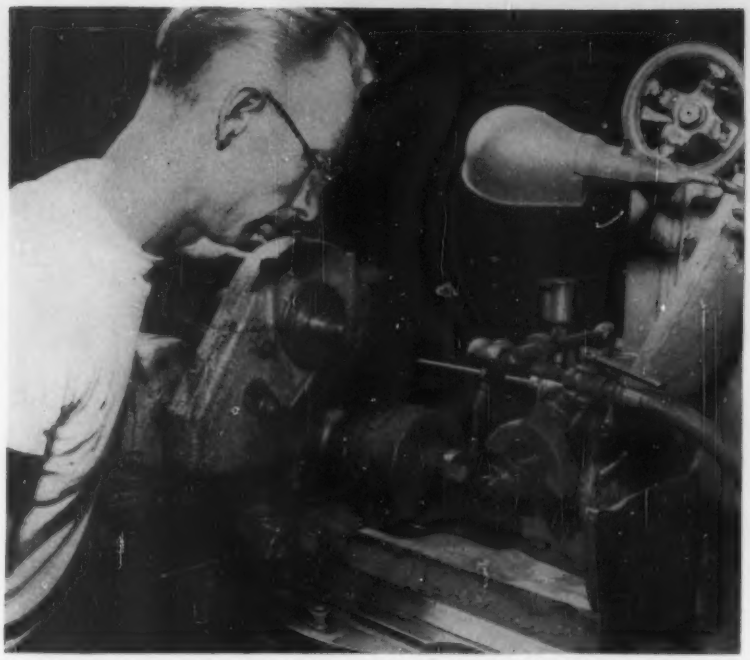
Rake angles of clamp-type inserts are made positive, broadening aplications on older machines, particularly multi-tool automatics. Changes improve sizing, avoid burrs, step up cutting rate 25 to 30% on new machine tools

BY MATT ALJANICH,
Superintendent of Tool Cribs
Peoria Plant,
CATERPILLAR TRACTOR CO.

Clamp-type toolholders generally are designed to tilt the solid-carbide inserts forward at approx 7° to provide side and front clearance angles without grinding. This, of course, results in negative rake angles when insert ends are ground flat and square with their axes.

But negative rake angles are not desirable for many operations where, otherwise, clamp-type single-point tools can be used economically. This is especially true on multi-tool automatic lathes of older designs where spindle power and toolslide design are not correct for negative-rake cutting.

Also, on many multi-tool turning jobs, the workpiece is so small in diameter in relation to length that negative rake tools cause deflections resulting in runout and inaccurate sizing of turned diameters. Another frequent objection is the tendency of a negative-rake tool to "throw" a considerable burr on the end of the piece as it leaves the cut. Such burrs are hazardous to operators, and frequently require costly second operations for removal. (*next page, please*)



HOLLOW GRINDING is done on a No. 13 B & S universal grinder using water containing a little rust inhibitor. Feed is by hand. Inserts are centered in special holders. Workhead is rotated during hollow grinding, locked when grinding chipbreaker ledges in same setup. Work is fed horizontally toward diamond wheel

These and other objections often can be minimized or eliminated by hollow-grinding the ends of the carbide inserts to change the negative rake angles to zero or positive effective rake angles, without affecting the clearance angles provided by the position of the inserts in their holders.

If the machine has sufficient power for cutting at conventional speeds and feeds with negative-rake tools, it sometimes is possible to increase the cutting rate by as much as 25 to 30% just by hollow-grinding the carbide inserts to provide positive rake angles—if finish is not a determining factor. And often the finish obtained with such tools can be improved by using larger corner radii on the inserts, by changing from a triangular to a square insert, or from a square to a round insert.

It costs more to hollow-grind the end of a carbide insert than to finish it flat and square with its axis. So we do not use hollow-ground inserts where this special grind is not warranted by careful cost analysis.

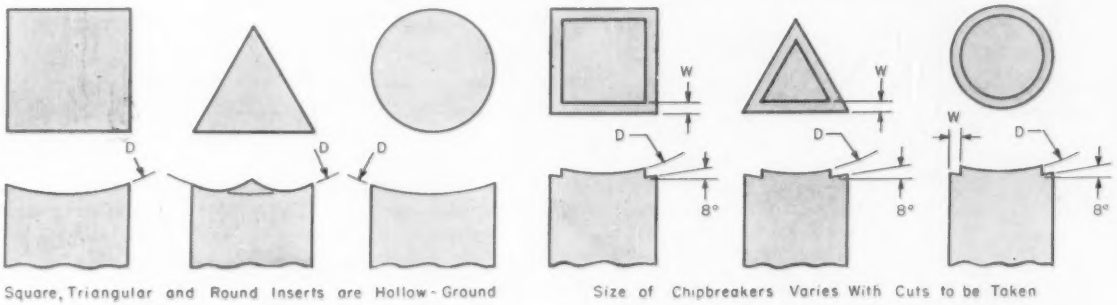
Caterpillar has been hollow-grinding ends of some solid-carbide tool inserts for more than four years, and the number of metal-cutting operations to which they are applied still is increasing. In fact, there are now so many of these applications that hollow-ground inserts are standard stock items in most tool cribs at the Peoria plant.

HOW TO GRIND

Hollow grinding is done with ⅛-in.-face diamond wheel ranging in 1-in. steps from 1- to 6-in. OD, with size determined by the size of the insert and the radius needed to provide the desired rake angle. Normally, 2-in.-OD wheels are used for inserts up to ½-in. inscribed circle; 3-in.-OD wheels for ½- to ⅝-in. inscribed circle inserts; and 6-in.-OD wheels for hollow-grinding large inserts. But some inserts are specially hollow-ground with larger or smaller than standard wheels to provide required rake angles.

Hollow grinding is done on a No. No. 13 Brown & Sharpe universal grinder, with the carbide insert held horizontally in the workhead. The axis of the rotating insert is centered with the face of the wheel and the axis of the wheel spindle. Workhead speed is approx 500 rpm; spindle speed is approx 3800 rpm.

Exploratory tests now being made indicate that the 5000 to 6000 sfpm speeds generally recom-



DIAMOND WHEELS from 1- to 6-in. OD with ⅛-in. face hollow-grind ends of solid carbide inserts. Chipbreaker ledges usually are 0.015-in. deep and from 1/32 to ¼ in. wide, depending on material to be cut, rate of feed, etc. Most chipbreakers on hollow-ground inserts are ground at 8° shear angle, as indicated above

mended for diamond-grinding cemented carbides may be too high for most operations. In fact, smaller wheels appear to cut better than larger wheels in the plunge cuts necessary to hollow-grind ends of solid-carbide inserts. We are convinced there still is a lot to be learned about carbide-tool-grinding operations if optimum results are to be obtained.

USE DIAMOND WHEELS

Both rough and finish hollow-grinding operations are performed with metal-bond diamond wheels. Silicon-carbide wheels do not stand up satisfactorily when plunge-grinding to produce the rough form, and both vitrified- and resinoid-bond diamond wheels wear too rapidly to be economical.

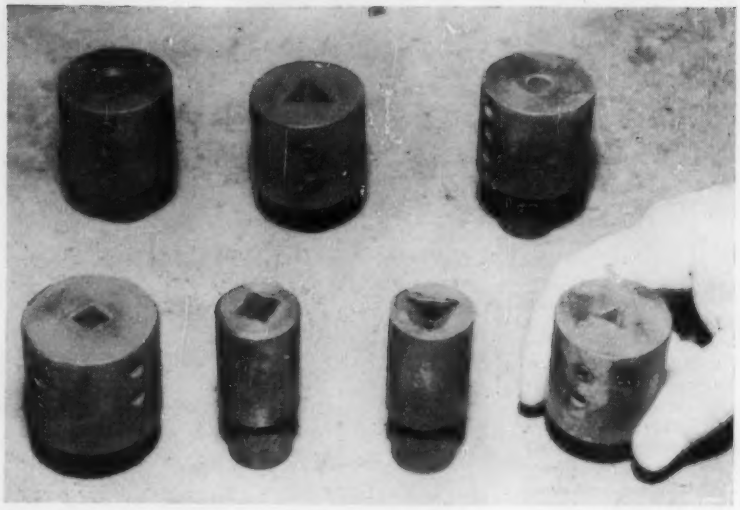
Hollow grinding is always done with a stream of coolant flooded over the workpiece at the point of contact with the wheel. The coolant is simply water containing sufficient rust inhibitor to prevent damage to machine and tool surfaces. Soluble-oil coolants lead to rapid wheel loading, while the water coolant does not. In fact, with the water, the metal-bonded diamond wheels are virtually self-dressing in plunge grinding.

HAND FEED

Feed of the workpiece toward the wheel is by hand, a slow, steady feed being necessary to insure optimum cutting action, and to prevent "crowding" that would lead to damage of wheel and work. The operator must develop a "feel" for the job, to determine when the wheel is cutting freely without developing temperatures that would cause heat-checking of the carbide.

Solid holders with cavities to fit the different types and sizes support the inserts in the three-jaw collet chuck of the grinder. These holders have setscrews for locking the inserts in place. Where chipbreaker ledges also are to be ground, the same holders are used in a second setup in the same machine. Wheel wear in hollow grinding is small and quite a few inserts can be ground before lipping is performed. Hollow-ground inserts are not left in the holders awaiting the lipping operation.

Diamond wheels of exactly the same diameter as those for hollow-grinding are employed when grinding chipbreaker ledges on the carbide inserts. For these operations, the axis of the workhead is offset from the axis of the wheel spindle to locate the ledges properly. Care must be taken that offset of the work is such that the back end of each chipbreaker ledge does not run into and damage the cutting edge formed by the chipbreaker ledge ground on the adjacent side of the insert. Often the workhead also is angled away from the wheel spindle to grind the chipbreaker ledges at a shear angle (usually about 8°) with the cutting edges (see sketch). Ledges must be kept at constant depth along cutting edges of the inserts.

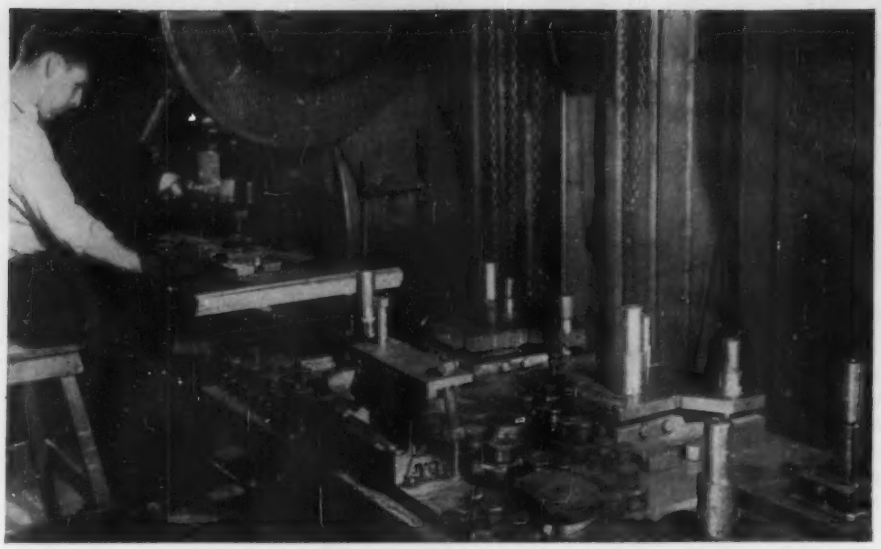


STEEL HOLDERS which center solid carbide inserts for hollow grinding ends and chipbreaker ledges are especially made for each type and size of insert. Each has setscrews to lock insert tightly in place. Holders are placed in collet chuck of grinder

APPROXIMATE EFFECTIVE RAKE ANGLES PRODUCED BY HOLLOW GRINDING END OF INSERTS

SIZE OF INSERT	DIAMETER OF DIAMOND GRINDING WHEEL (Inches)					
In.	1	2	3	4	5	6
TRIANGULAR INSERTS (size of inscribed circle)						
¼	23°	8°	3°	½°	—1°	—2°
⅜	43°	15°	8°	4°	2°	0°
½		23°	13°	8°	4½°	3°
⅝		33°	18°	12°	8°	6°
¾		42°	23°	15°	10°	7°
SQUARE INSERTS (length of side)						
⅜	26°	9°	4°	1°	—1°	—2°
½	39°	14°	7°	3½°	1¼°	0°
¾		25°	14°	8°	5°	3°
ROUND INSERTS (diameter)						
¼	9°	1°	—1½°	—3°	—4°	—4½°
⅜	14°	3½°	0°	—2°	—3°	—3½°
½	24°	8°	3°	0°	—1°	—2°

Calculations are based on the insert being supported to provide 7° side and front clearance angles.



SMALL SPECIAL PARTS are frequently required during construction. When these can be made on a press, drawings are made in sheet-metal shop, dies are designed and made, and parts produced right on the job. This results in fast service at reasonable cost, and avoids delays of soliciting bids, ordering, and shipping

New techniques build new atom plant

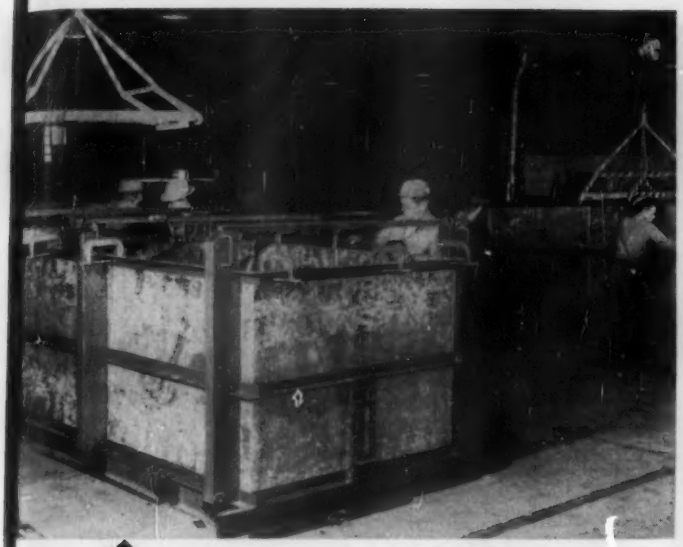
Construction of a $1 billion U-235 plant for the Atomic Energy Commission at Paducah, Ky, brought about a whole new series of problems for the contractor, F H McGraw & Co. New techniques were developed, and unusual applications of proved construction practice were introduced. Ideas were adopted from workers and supervisors to supplement broad management planning to insure the fastest possible construction consistent with maximum quality and minimum costs.

So large was the project that complete temporary shops were set up within the plant for pipe fabrication, sheet metal work, instrumentation, structural steel fabrication, and maintenance. Each unit was established with its own drafting staff, where needed, expert supervisors, and complete fabrication facilities.

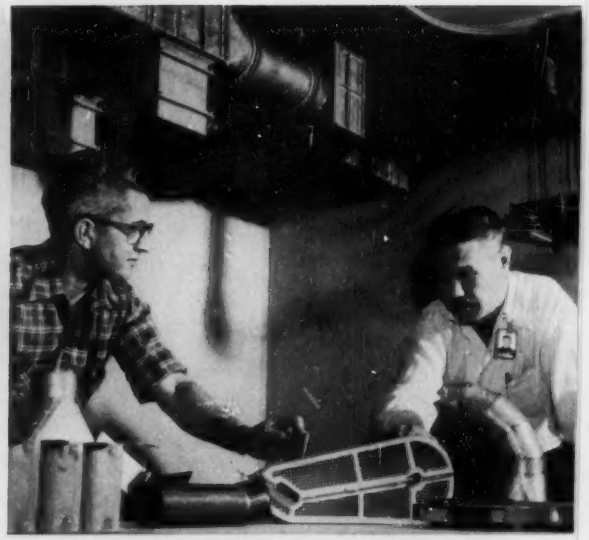
In addition, quality control laboratories were established for welding operator training and qualification, for concrete testing, for checking of the cleaning solutions and for control of the contents of the huge cleaning tanks.

Because scrupulous cleanliness is essential in a plant of this nature, special precautions had to be taken throughout all equipment installation and testing to exclude dust and foreign matter.

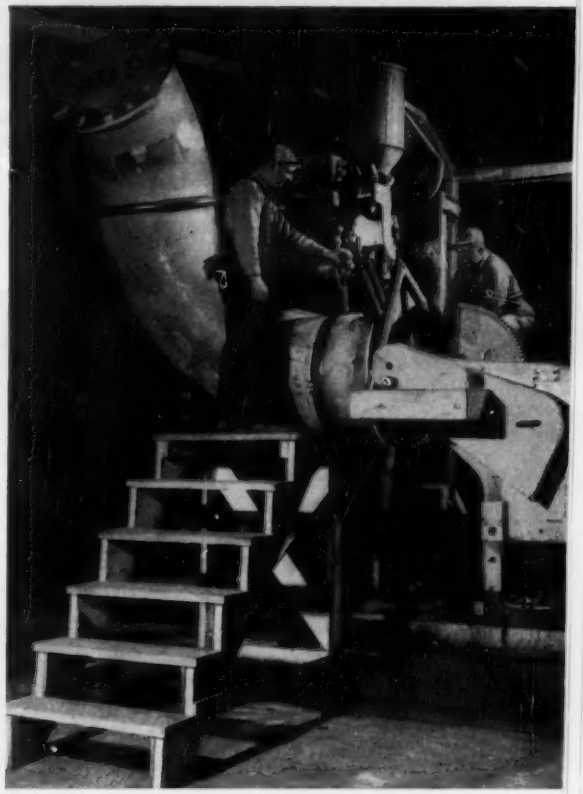
ADJUSTABLE WELDING FIXTURE for metal ductwork can accommodate work of varying length and diameter. Sections are clamped to manually rotated faceplates, tacked, then manually welded. Tailstock end is adjusted by crank (right). Note exhaust fan at headstock end for removal of welding fumes and smoke



LARGE DUCT SECTIONS are major product of sheet-metal shop. Special jigs position angle-iron reinforcing frames while sheets are clamped, drilled, and riveted. Before riveting, entire assembly is squared up by crank-operated adjusting devices. Note "ice-tong" grips for hoisting completed assemblies. Assembly method insures interchangeability

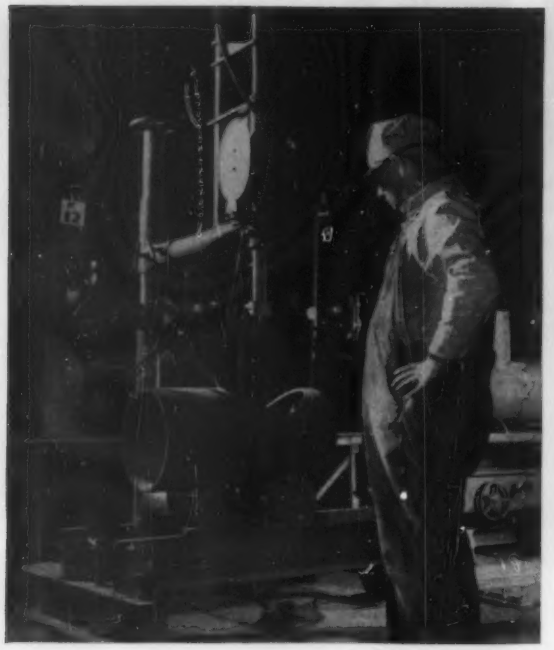


SCALE MODELS have proved highly useful in guiding shop workers during fabrication, and particularly in helping installation crews to visualize the completed job. Note the elaborate ductwork in the overhead model (Above right). Resultant accuracy and speed of installation have more than justified the cost of making the models

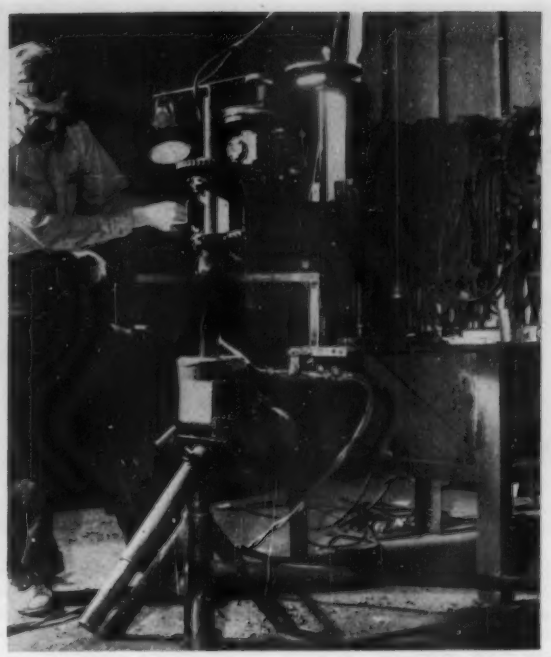


SPECIAL WELDING MACHINE performs multi-pass, submerged-arc welds on nickel-lined process piping in pipe shop operated on site by M W Kellog Co as subcontractor to McGraw. Pipe is cleaned in special cleaning building (part of permanent facilities), then inspected and installed. Tightness of all joints is tested under high vacuum

SHOP-MADE POSITIONER for small welding jobs holds work in lathe chuck rotated by motor and speed reducer taken from discarded machine. Foot-operated switch controls start, stop, and reverse motions. This is typical of the time- and effort-saving ideas suggested by construction personnel

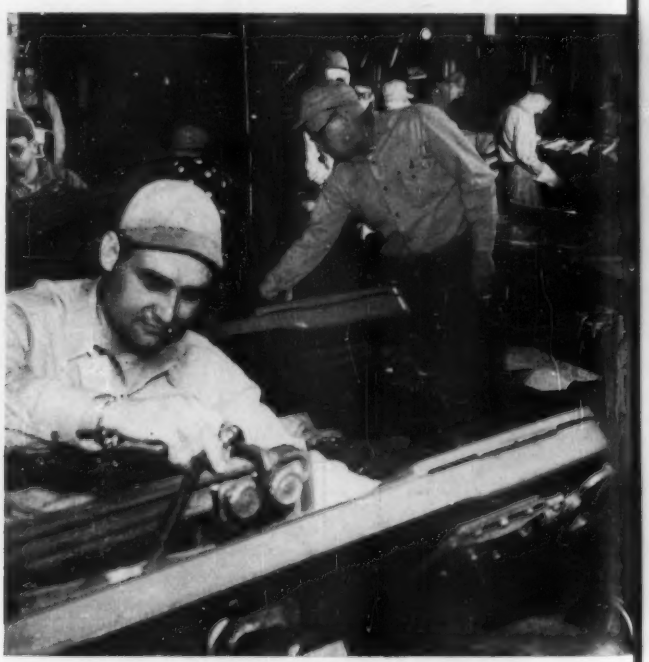


AUTOMATIC HOLE CUTTER forms openings in side of pipe for welded "T" and angular branch joints. Path of cutting torch is controlled by linkage and cam on head of machine. Different cams can be substituted for different sizes of pipe and hole contour

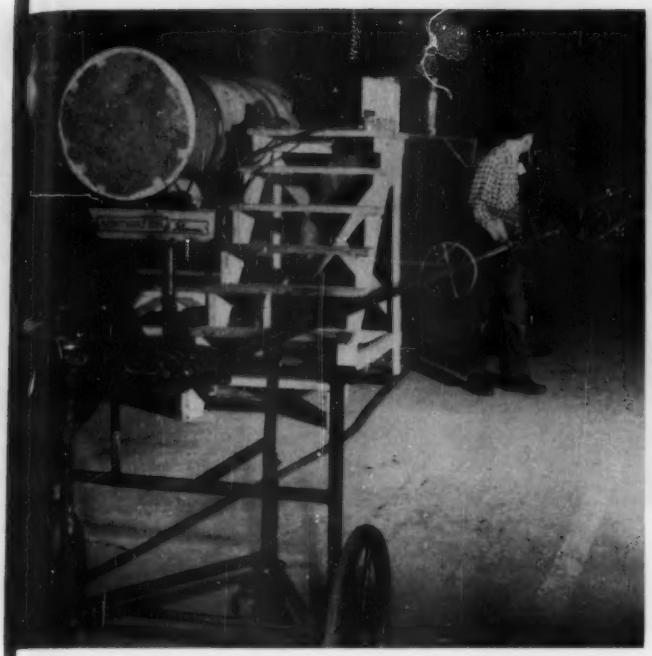


PIPE END BEVELING in preparation for welding is done on home-made machine which rotates cutting torch around edge of work. Supporting arm for torch can be adjusted over wide range to accommodate a variety of pipe sizes to be handled

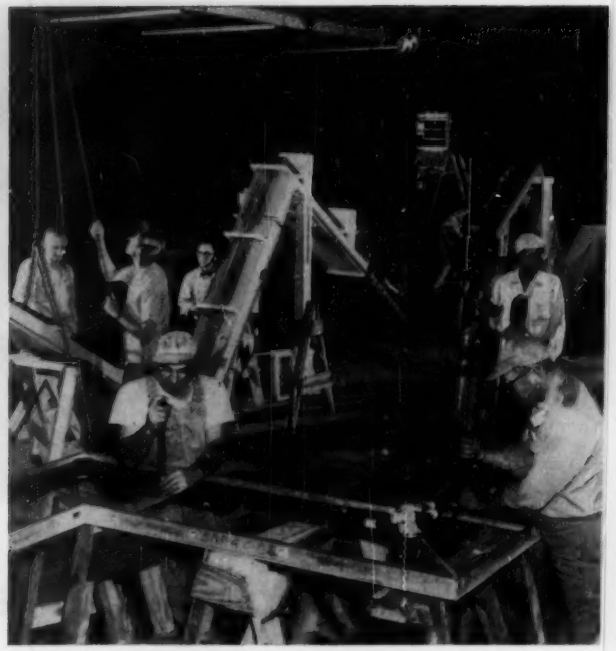
FELT PADS are employed to support instrumentation lines. Felt, 1 to 1¼ in. thick is cut into strips with rotary cloth cutter, perforated by pneumatic punch (foreground) using hole spacing jig, then slit from edge to hole with simple hand shear to permit insertion of tubing



WELDOR TRAINING SCHOOL and qualification testing laboratory was set up to provide supply of operators competent to perform all types of welding on alloy steels, aluminum, nickel alloys, and stainless steel, as well as welding and brazing of similar and dissimilar metals. Weldors must pass AEC qualification tests



PIPE CLEANER will wire-brush inside of pipe sections up to 60 ft long. Special head carries four brushes, adjustable for varying pipe diameters, and is mounted on long shaft driven by air motor. Carriage is moved forward to feed brush through pipe. Wheels on shaft support it inside the pipe to stop whipping



PNEUMATIC INSTRUMENTATION system requires miles of tubing. Prefabrication system set up in 20,000-sq ft shop permits instrument racks to be fabricated, assembled, and tested, then sent to building for installation. Valve assemblies and connections are also fabricated and tested here before installation. Strict cleanliness control is exercised to prevent dust or moisture from entering tubing or instruments

LARGE PIPE ENDS are squared off and beveled in preparation for butt welding, by automatic machine installed inside pipe. Cutting torch support arm is adjustable for different sizes of pipe and is rotated by spring-operated mechanism

AUTOMATIC, SUBMERGED-ARC WELDER joins ends of large pipes by multi-pass welding. Hydraulic clamp inside pipe ends expands against walls of both sections to insure roundness and accurate alignment. Power-operated roller rotates pipe on roller supports during welding

FOUR EDGES OF A CONTROL CABINET are punched and notched in one setup

Courtesy Cincinnati Shaper Co

VERSATILE PRODUCER...THE PRESS BRAKE...II

PIERCING AND NOTCHING UNITS

Where presses with large bed areas are not available, the press brake can be

By J M MATTHEWMAN, Works Manager JAMES SMART PLANT, CANADA FOUNDRIES & FORGINGS, LTD

Although press brakes are basically designed for forming and bending sheet-metal sections, there is an aspect to their use in many plants that has escaped general notice. Over the past 15 years the cost-reduction spotlight has been focused on technical improvements in machine equipment, tool materials and design, mechanized work-feeding devices and performance of coolants and lubricants. Major advances have been gained in this field but in many shops the potential savings have not been realized by failure to devote equal study to work handling between operations.

This was — and too frequently still is — the practice in custom jobbing shops where volume production flow cannot be set up. Repetitive handling has become so familiar to many plants that it is assumed to be essential rather than being scrutinized as time-wasting.

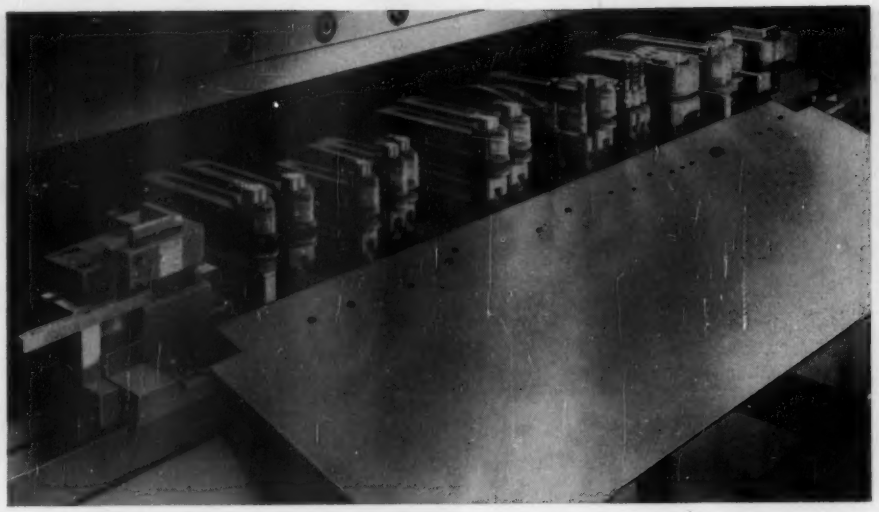
For the wide range of sheet-metal work within its area and tonnage capacity, no machine has greater potential to reduce interprocess handling than the dual-purpose press brake. Our studies include one job where seven men operate a 10-ft press brake, five along the front and two at the rear, to finish refrigerator - cabinet panels. Had these components been tooled up in individual punch presses the same number of operators would be required *plus* six intermediate handlings.

BETTER WORK RHYTHM

We frequently fail to recognise another important feature which becomes possible with multiple, progressive tooling setups in wide-bed, dual-purpose press brakes. This matter is the efficiency gained by synchronizing several operations. Two or more operators on a continuous job invariably produce more completed parts, and maintain better balance of processes, than is found when each stage of the job is performed in a separate machine. The latter practice usually results in "bottlenecks" of work at heavier and slower presses, plus time consumed in rehandling, and possible damage to parts stacked up between operations.

A typical combination setup to notch sheet-steel sections is shown. These small-area die sets can be attached to the standard bed rail and ram along with brake forming tools. Larger-area dies for notching and piercing would require angle plate attachments extending the partial or full width of the press brake bed and ram.

Die sets originally designed for conventional punch presses may be altered readily for press brake use by detaching the punch-holder shank and using adapters to arrange shut-heights suitable for



VARIABLE HOLE SIZES are pierced and corners notched in universal units

Courtesy Wales-Strippit Corp

PERMIT PROGRESSIVE SETUPS

fitted with commercial die sets and punching and notching units of small area

working them in combination; or with brake forming tools. Many operators argue that a punch-press notching or piercing die cannot clear its slugs if mounted in a press brake because there is no hole in the bolster. For small-area punchings it is a good practice to place spacer bars under the die set and clear the slugs manually. With large-area punchings it is much handier to install a spring-loaded knock-out in the die cavity which returns the slug to be cleared from the die surface.

STANDARD NOTCHING UNITS

For short runs and variable corner-notch sizes, the use of Wales-Strippit or similiar notching units proves handier and more economical than single-purpose, guide-pin die sets. The standard 90° corner notching units allow a notch size range up to 5 × 5 in. in mild steel up to ⅛ in. thickness. The corner notching units may be fitted with adjustable side gages which include built-in scales for quick, direct reading for setting up. Another feature is that left-hand and right-hand units may be located in a press brake to complete the notching at one end of a blank in a single stroke.

Standard notching units, also with capacity up to ⅛ in. thick mild steel, are made for:

90° V notching.

Radius notching—0.062 to 3.5 in. radii.

Edge notching — 1½ × 1 in. up to 3 × 8 in.

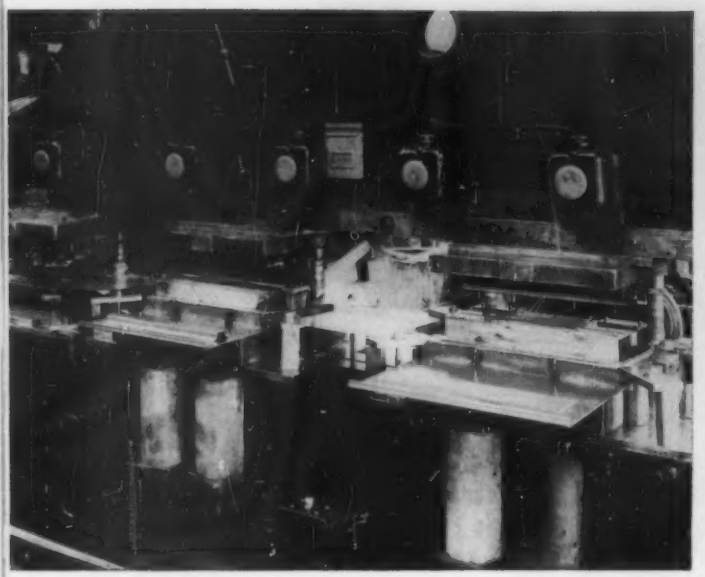
Special shapes.

All types of notching units in this complete group have a standard shut height of 5½ in. and a die height of 2 19/32 in. These standard dimensions are also maintained throughout the entire size range of universal piercing units. Thus, multiple setups to combine notching and piercing work are possible without shimming or otherwise adjusting die heights.

Another progressive setup completes the forming and piercing operations on a support bracket. This part was formerly processed in separate punch presses with trucking required between each stage. Note the six electrical push-button controls installed on the ram face. After placing the workpiece in his die, each operator must hold *both* contacts closed to start the press stroke. If any one contact is released during the stroke the ram motion is stopped.

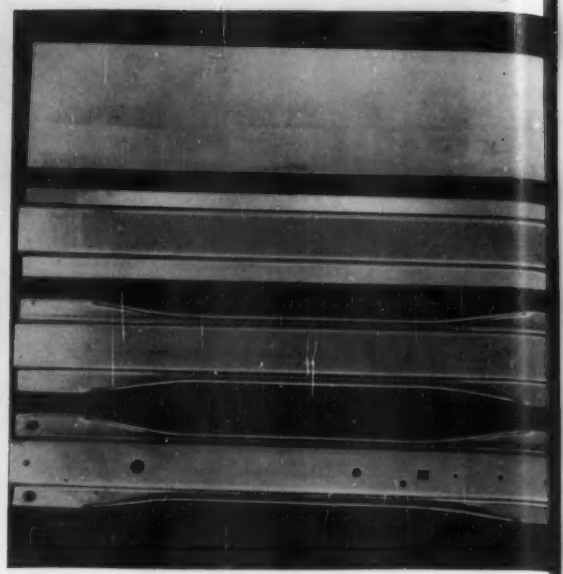
PIERCING

Two types of tooling setups may be used for a wide range of piercing work in press brakes. The first type comprises single or multiple piercing tools assembled in a guide-pin die set. A means of clearing the slugs must be provided (as



IN-PROCESS TRUCKING was eliminated by the progressive setup to make a pierced and formed steel bracket

Courtesy Cincinnati Shaper Co



A FORMED BRACKET like this is easily passed from station to station on the press brake

suggested above), but this type of tooling layout is efficient for volume production. Where the job requires a piercing die having a large number of tools the designer should consider using ball-lock punches and ball-lock die inserts. These punches and die inserts, produced by Richard Brothers Div, Allied Products Corp, Detroit, may be removed and replaced *in the press* in a few minutes, and without disturbing the alignment of the punch-holder and the die-holder blocks. On one job of piercing multiple holes in T-section steel posts for fire fence, the press downtime for punch replacement was reduced from 29 to 2% of its working time. The fence-post material is re-rolled rail steel and punch changes are necessarily frequent.

Piercing setups to use ball-lock punches and die inserts may be designed for standard punch and die holders supplied by the punch makers; or where hole spacing is close, special blocks may be ordered to accommodate ball-lock tooling for practically all layouts.

The second type of tooling setups consists of universal piercing equipment of the Wales-Strippit or Whistler types, as specifically designed for use in press brakes. Most of these units are self-contained piercing tools, which require no attachment to the press ram. Their punches are self-stripping and the unit is simply bolted to the bed rail or to the lower bolster. Slug clearance is no problem with these tools, because the punchings are ejected from the individual dies above their bases.

T-SLOTTED PLATES HELP

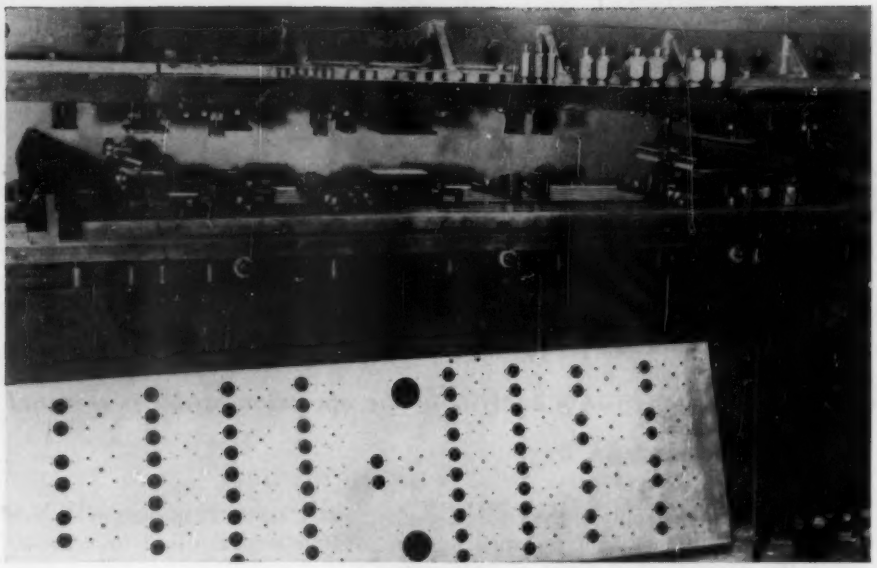
For large-area jobs where the throat depth of self-contained piercing units is not sufficient, a similar two-piece, self-stripping unit is available for assembly in a guide-pin die set or bolted to T-slotted plates for each job layout. The multiple piercing and hole-size range produced by these Whistler punching units demonstrates the workpiece area which can be handled with this tooling in a press brake. The same tools are adaptable to many other job layouts.

The standard dies and punches accommodated by each size individual unit may be purchased with a variety of diameters—or shapes other than round — for quick-change replacement. For example, punches and dies from ⅛ to ½ in. dia for piercing ⅛-in. thick mild steel plus square, or round and other shapes, may be used in standard No. 8-BL punching units. Larger units will accommodate punches and dies up to 1.125 in. dia.

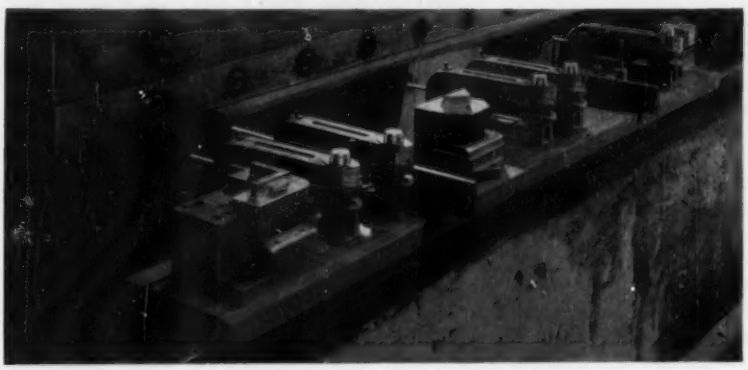
Three methods of mounting universal piercing units are used, depending on job volume. Where the press brake is fitted with angle plates and bolsters for wide-area work, the piercing units are fastened to a ½ in. thick steel templet as a complete punching setup. These templet setups can be prepared while another job is running, thereby reducing change time to a matter of minutes.

One case study, conducted over a five-year period, illustrates the value of progressive operations using four men along a 10-ft. press brake. A radio manufacturer's delivery schedule required three models being produced simultaneously, but the total output of each type could not justify special-purpose dies. Notches and hole patterns in the formed steel chassis were so closely spaced that arranging all piercing tools in one die set was impractical. One failure among the 68 punches would have shut down production.

The first tooling layouts required



TWO-PIECE UNIVERSAL PUNCHING UNITS are assembled on T-slotted plates for a large-area job
Courtesy S B Whistler & Sons, Inc



SELF-CONTAINED PIERCING AND NOTCHING UNITS can be assembled on a strip templet
Courtesy Wales-Strippit Corp

nine punch presses with materials handling between each stage, plus extremely close gaging of the hole spacings. Another engineer proposed setting up the complete notching, piercing and forming of each model radio chassis as a four-stage progressive job in a press brake equipped with angle plates, bolsters and interlocking safety controls. Standard notching units, universal piercing units and stock-positioning guides were assembled on each of four templets. These ½-in. steel plates were jig drilled to assure required hole-spacing accuracy. The four-stage setup is removed and replaced by a similar templet assembly for another model in a "down-time" of only 25 to 30 min.

During these five years some 27 different types of radio chassis have been produced, *using the same group of piercing and notching units*. This adaptability is possible because of the punching size range of each individual tool. Die inserts and matching punches with proper clearance for workpiece thickness are available at a few dollars cost, either as replacements for worn tools or to produce any hole size within the limits of the particular holder.

An alternate practice is to mount the piercing units on a T-slotted plate which is fastened to the press-brake bolster. Each piercing unit is bolted in exact position by aligning with a job templet. Where close tolerances are specified for hole locations, the piercing punches are replaced by "set-up" punches which are exact hole size without shearing clearance. When all units are secured in position the setup punches are replaced by the "working punches."

These arrangements of piercing and notching units on a single- or multiple- T-slot plate do involve increased down-time for the press brake, but they prove economical on short-run jobs. The competitive-minded jobbing fabricator now has a ready stock of standard piercing and notching units, a variety of hole sizes in his die-spares stock, and T-slotted plates for rapid set-ups on rush jobs.

A third method of mounting universal piercing and notching units is used for long, narrow jobs in press brakes that do not have angle plates or bolsters. The punch maker can supply a "strip templet" keyed to fit the bed rail in the same manner as brake forming tools. Strip templets are standardized to be interchangeable in the bed rail slot. Notching and piercing work on filing cabinets, metal furniture, furnace casings and many other products is usually located close to the edges of the part. With the strip-templet setup of piercing units, all jobs of this type can be adapted to a standard press brake.

Cope Talks on Draw Dies...VIII

Wide-Flanged Shells Draw Easily If You Follow

Normally, more operations are required to make wide-flanged shells than ordinary ones. Careful step-by-step analysis of the operation layout is essential

Wide-flanged shells are more difficult to make than either flangeless or narrow-flanged shells of equal size.

Shallow shells can be drawn or stretched in one operation if the reduction in diameter is not too great and the drawing and bottom radii are proportionately large. If the reduction in blank diameter is more than 50%, the operation will be almost entirely one of stretching. Little or no metal will be drawn from the outside of the blank.

If the drawing or bottom radius of a shallow shell is small, as shown in Fig. 1, two operations will be required. The first shell, Fig. 2, is drawn with large radii, and is slightly larger in diameter and higher than the finished shell. The shell is then reduced and stamped into its final shape. The drawing and bottom radii are usually laid out to form a reverse curve.

DEEP SHELLS

There are two methods for drawing deep, wide-flanged shells. The first method consists of drawing the blank into a flanged shell, and then reducing the diameter of the shell and increasing its height in a series of redrawing dies, all without disturbing the outside diameter of the flange, Fig. 3.

The second method consists of drawing a flanged shell with large drawing and bottom radii to a depth equal to or slightly greater than the depth of the finished shell. The diameter of the shell is then reduced in a series of redrawing dies. The outside contour of the flange is not disturbed during the redrawing operations, and the heights of all shells remains practically the same, Fig. 4.

The proper method to use depends upon the diameter and height of the drawn portion of the shell, the thickness of stock, the shape and the size of the flange, and the location of the draw in relation to the flange.

Both methods are based on a comparison of areas between the flat blank and the shells. Each preliminary shell, as well as the finished shell, must contain the same number of square inches of metal as the blank, in order to make one shell draw into the next without straining or thinning the metal.

The method shown in Fig. 3 is ordinarily preferred to that shown in Fig. 4, and should be used when working with thin metal or in drawing shells that are deep in relation to their diameter. The method shown in Fig. 4 is suitable for drawing large and comparatively shallow shells from heavy stock, where considerable stretching can take place. The advantage of this method lies in the large drawing and bottom radii. These radii permit the shell to be drawn to its full height in the first operation. They allow the metal to stretch, or thin out, over a large area without straining or fracturing the shell.

The method shown in Fig. 4 should also be used to draw or stretch deep shapes, Fig. 5, that are located near the edge or in the corner of a large sheet, when it is necessary to pull the metal from one or two sides instead of from all directions. If the draw is deep, or is located a considerable distance from the edge of the shell, a hole should be pierced and a separate shell welded in place.

DIAMETER REDUCTIONS

If the blank is not reduced more than 45% in the first operation, the metal will thin out only a few thousandths of an inch, even though the draw is deep.

If the metal is ⅛ in. thick or more and the draw is to be completed in two or three operations, and thinning of the metal is not objectionable, it is possible to draw and stretch the first shell over a punch with a diameter as small as 40% of the blank diameter (60% reduction). This is true when the shell height does not exceed one-third of the diameter of the drawn portion, (Fig. 6). The thickness of the metal at the bottom radius will be approximately two-thirds of the original thickness. Shell breakage will occur if an attempt is made to reduce a blank more than 60%, or to a height greater than one-third of the diameter.

When the flange is wide in only one or two places. Fig. 7, the operations should be laid out for an ordinary plain shell. The round portion of the blank may be re-

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the Rules

By STANLEY R COPE, President
ACME SCHOOL OF DIE
DESIGN ENGINEERING

Fig 1 Fig 2

FIG. 1 . . . Small bottom radius dictates two operations for this shallow shell. FIG. 2 . . . First step is to draw a shell slightly larger and with larger radii

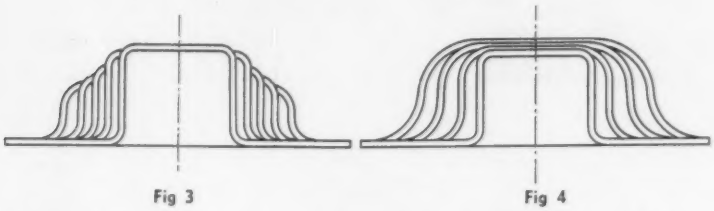


Fig 3 Fig 4

FIG. 3 . . . One method of drawing a deep shell is to produce a series of shells progressively deeper and narrower. FIG. 4 . . . Alternate method starts with full depth and then reduces the diameter in steps

duced the regular amount for first-operation dies (40%). The ears, or wings, will ride in "free", providing that the ears are not too wide and do not extend too far around the periphery of the shell.

OPERATION LAYOUTS

Operation layouts for wide-flanged shells should be made in six steps. See Fig. 8.

STEP 1. Trim stock is added to the flange, and the diameter of the blank is found by the graphical method explained in a previous instalment.

STEP 2. Correct percentage reductions for the drawing and redrawing operations are taken from tables, and diameters of the various shells are computed. The walls of the shells are then drawn.

STEP 3. Approximate height of each shell is estimated, and the square-cornered bottoms are drawn in each shell.

STEP 4. Drawing and bottom radii are laid out. There are no fixed rules for these radii. The radii of the first-operation shell should be large, and then gradually made smaller on each subsequent shell, until the part-print radii on the finished shell are reached.

STEP 5. Compute the height of the straight cylindrical side wall of each shell, and draw the shells to scale. These heights are computed by dividing each shell into five sections, as shown, then subtracting the sum of the areas of sections 1, 2, 4 and 5 from the area of the flat blank, and dividing the difference by the mean circumference of the drawn portion of the shell to find the height of section 3.

STEP 6. The layout is completed by adding dimensions and other pertinent information necessary in laying out the dies.

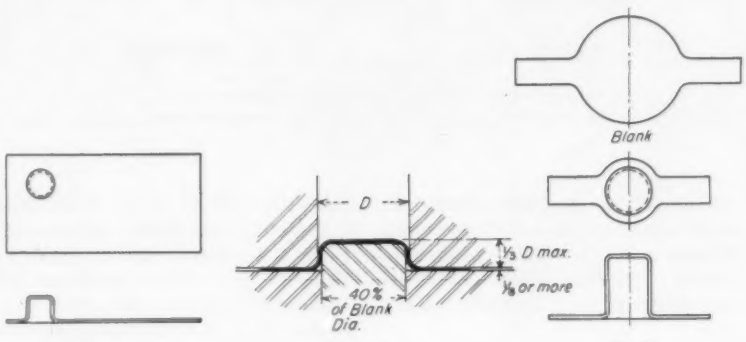


Fig 5 Fig 6 Fig 7

FIG. 5 . . . If a deep shape is located near the edge of a piece, the drawing method of Fig. 4 is used. FIG. 6 . . . 60% reduction is possible if the height does not exceed one-third the dept. FIG. 7 . . . When the flange is wide in only one or two places, the rules for drawing an ordinary shell apply

DESIGN OF DIES

Dies for drawing wide-flanged shells are similar to ordinary drawing and redrawing dies. Most first-operation shells are blanked and drawn in single-action combination dies, similar to those shown in Figs. 9 and 10.

First-operation shells usually have very little or no straight cylindrical side wall. For that reason they cannot be carried up in the die and ejected with a positive knockout. Therefore, dies are equipped with spring-backed knockouts that eject the work and leave the shell lying on the die so that it can be pushed clear by the advancing strip. When these dies are small they are equipped either with spring strippers, or with solid strippers having one side open. Hook strippers are used on large dies.

Both the shells and the dies have been designed so that the correct height of the shell can be found by raising or lowering the slide of the press. If the shells were designed as shown in Fig. 11, the height to which the shell could be drawn would be limited.

The flange of the larger shell is drawn on a 5° angle, and the top

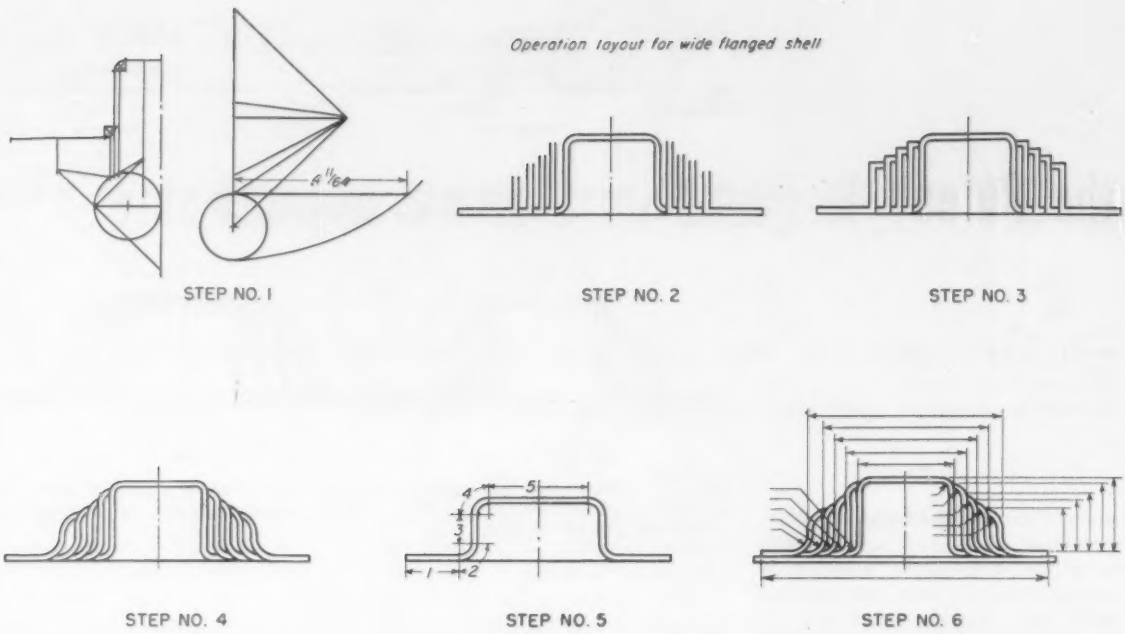


FIG. 8 . . . Six steps should be followed to lay out the operations for a wide-flanged shell. An orderly procedure avoids mistakes and saves time

of the shell is crowned to make the metal draw more easily and reduce thinning of the metal to a minimum. The crown and the flange are flattened in the second operation.

The upper combination blanking punch and drawing die of the smaller die, Fig. 9, is made in one piece while that of the large die is made in two pieces. When the cutting portion of the punch is a separate piece, the punch can be sharpened without disturbing the radius of the drawing die.

Two tapped holes are provided for removing the draw ring from the die, Fig. 10. Thus, pressure pins can be taken out when it is necessary to remove the die from the press. These holes must be located so that the metal does not flow over them.

COMBINATION DIE

In a combination die, the die holder should have a hole large enough to receive the draw ring and the blanking punch before the outside diameters of these details are machined. This is necessary to develop the blank. Right half of Fig. 10 shows die as it appears before the cutting edges have been completely machined and assembled. The detail shows how the draw ring is lifted into place and removed from the die.

Automobile brake backing plates and similar items that are drawn from thick metal and not more than 1 in. deep can often be drawn in one operation. The method is to draw and stretch the metal to its limit (to about a depth of ¾ in. for a 6 in. dia) and then get metal for the remaining height by stretching a hole, which has been pierced in the top of the shell just before the metal is ready to break. The center punch is called a strain-relief punch. It should be made so that it can be easily adjusted for height, because it is important that it pierce the metal at a certain time. It must be kept sharp and free from nicks so that the burnished band in the hole it pierces will be smooth and unbroken. Otherwise, the metal will split when the hole is stretched oversize. The hole is later recut to size.

Shells that have been drawn from 1/16 in. or heavier metal are redrawn in dies similar to that shown in Fig. 12. The shell to be redrawn is located in the hole in die *A* and rests on knockout plate *B*. In its normal position, *B* is held a short distance below the top of the die ring by rod *C* and a pull-up or pressure attachment. When the slide descends, punch *D* enters the shell and reduces its diameter by forcing the shell into the die. Plate *E* strikes the flange at the end of the stroke to flatten out any wrinkles or buckles.

When the slide returns to its up-position, knockout plate *B* ejects the shell from the die and the work is carried up with the punch. It is stripped from that member near the top of the stroke by knockout plate *F* and rod *G*.

PRELIMINARY REDRAWING DIES

In preliminary redrawing dies provisions are made for adjusting the punch either up or down so that the correct height of each shell can be quickly found by trial. A space of ⅛ to ¼ in. is left under the shoulder of the punch to permit shimming the punch down in case the shell is too shallow. When a soft plate shim is used it is not necessary to alter hardened details. A plate is not necessary in the final

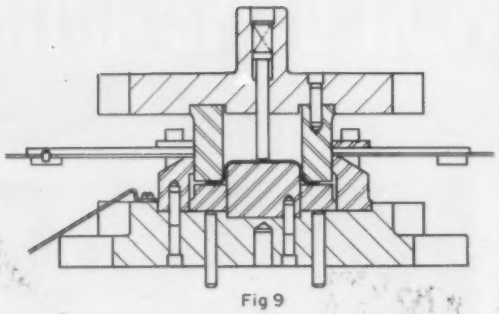


Fig 9

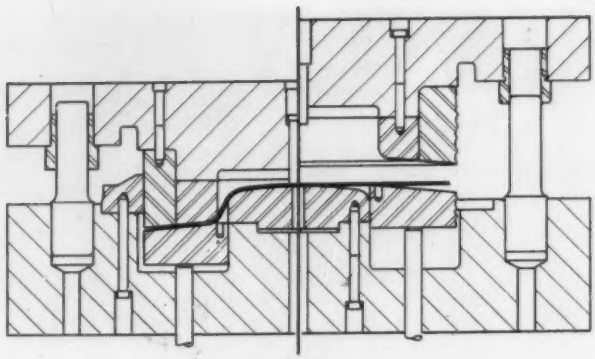


Fig 10

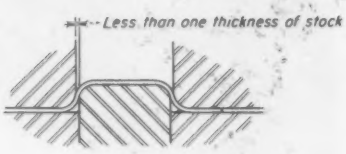
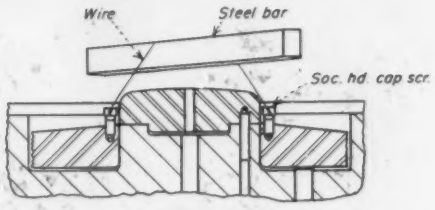


Fig 11



FIGS. 9 AND 10 . . . Most first-operation shells are drawn in single-action combination dies. The smaller die has a one-piece combination blanking punch and drawing die. Right half of larger die shows the tool as the cutting edges appear before being completely machined and assembled. The detail shows how the draw ring is lifted into place and removed from the die. **FIG. 11** . . . If the punch clearance is less than one stock thickness, the height of the shell will be limited

redrawing die shown but provision should be made for shimming the punch downward to compensate for thinning of the metal in the bottom of the shell.

When the stroke of the press is too short to permit the use of a positive knockout in the punch, or the press is not equipped with a pull-up or pressure attachment, redrawing dies may be constructed as shown in Fig. 13. When the slide returns to its up-position, if the shell should remain in the die, it is ejected from the lower die ring by knockout plate *A* and rod *B*. If the shell sticks on the punch, and rises with that member, it is stripped by plate *C* by means of rods *D*, when pull-up plate *E* strikes the bottom of the die holder.

Part IX of Mr. Cope's series will appear in an early number.

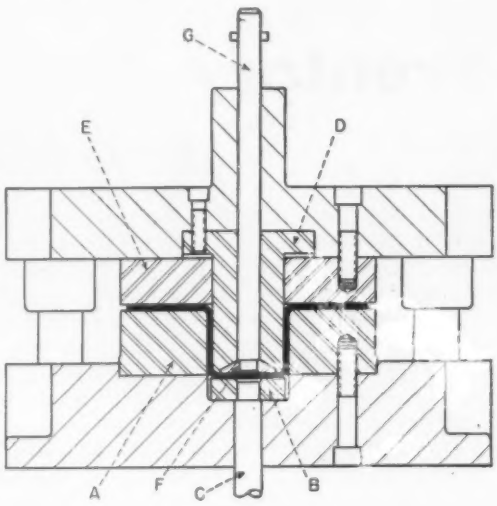


Fig 12

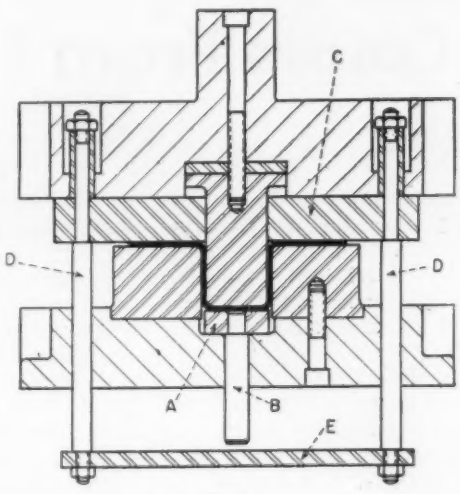
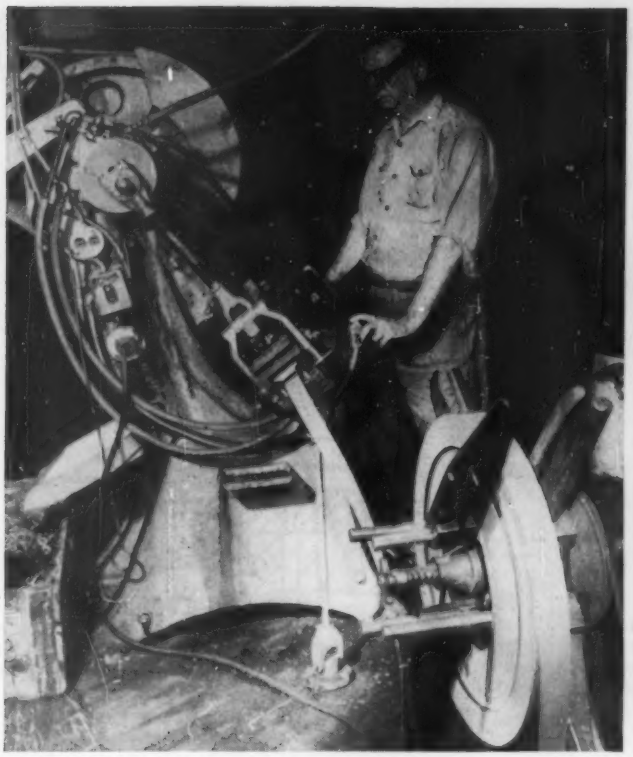


Fig 13

FIG. 12 . . . Shells drawn from stock 1/16 in. thick and heavier are redrawn with a die fitted with a positive knockout. **FIG. 13** . . . If the positive knockout cannot be used, the work is ejected by a plate operated by the punch holder



85,000 BATTERY TOPS per day are produced from pre-coated coil stock with one punch press and operator

FLASHLIGHT TUBES blanked from pre-coated coil are embossed to provide a hand grip, then rolled and the edges joined with a lock seam

Pre-coated coil, red on one side and gold or black on the other, gives...

3 Colors From 1 Inventory

By adopting pre-coated metal coil for the production of tops for flashlight batteries, Bright Star Industries, Clifton, NJ, has been able to increase production and at the same time cut the size of inventory required.

Formerly produced from lithographed sheet, the method for blanking and drawing the tops required slitting the sheet into strips, stacking, then feeding into the press. With two men, production was 40,000 tops per day.

Pre-coated coil manufactured by Enamelstrip Corp is 1⅝ in. wide, 0.010 gage ± 0.001 in. With an automatic coil feed and only one operator, production is 85,000 tops per day.

Unusual requirement is that depending on type and size of the battery, tops may be red, gold, or black — with red predominating. By purchasing strip coated on both sides (red on one side, gold or black on the other), Bright Star has been able to cut inventory in half. Any coil can be used to produce red tops. For gold or black tops, it is only necessary to select a coil with the proper color on the reverse side and feed it into the press with this other side up.

Added advantages of coil have been the reduction in scrap, compared with sheet feeding, and the fact that color remains uniform through a coil. The finish is bonded to a coil by a phosphatizing process and is reported to stand up without damage under the drawing of a rim around the cap and subsequent tumble feed and automatic assembly operations.

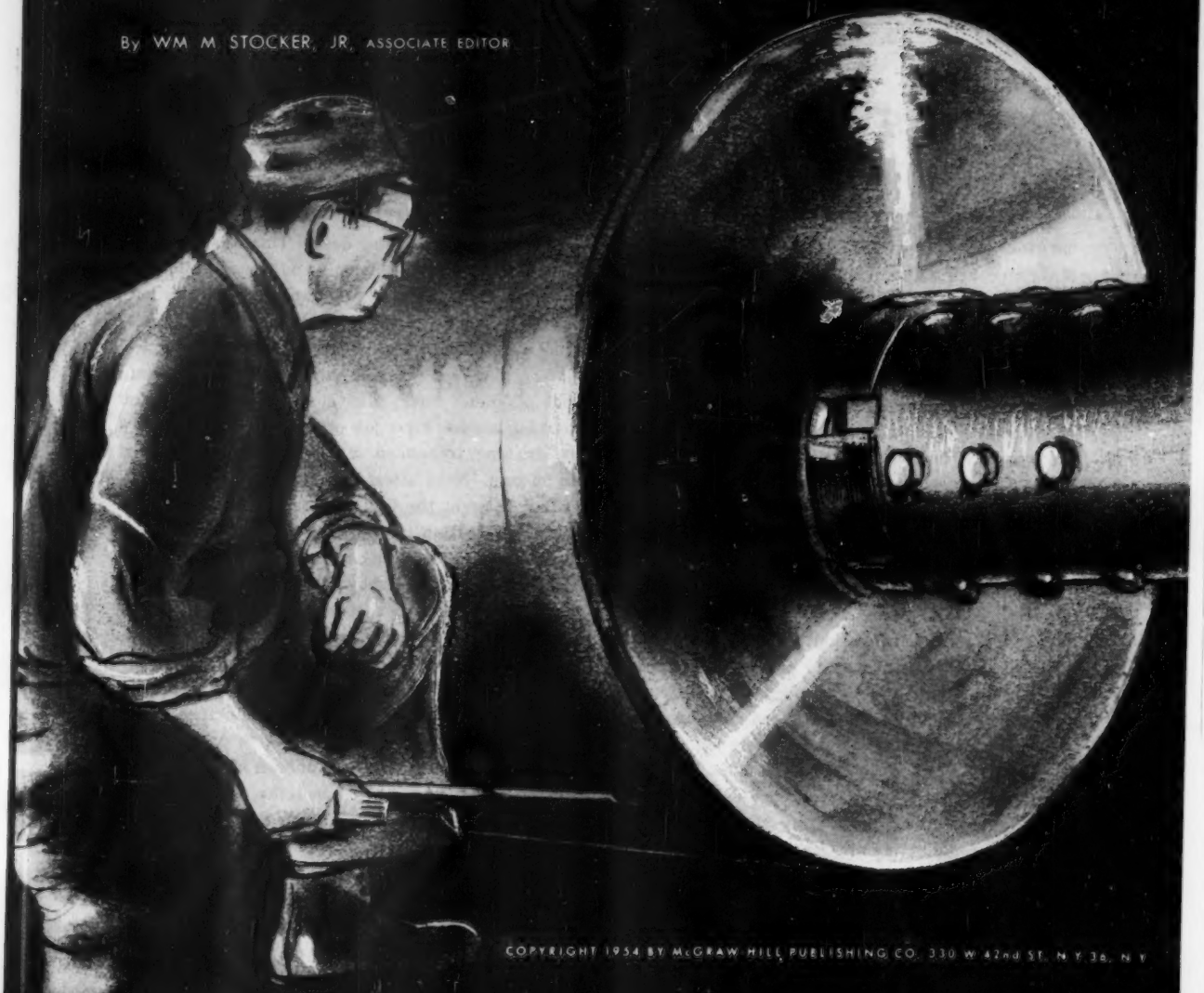
HIGH-SPEED TREPANNING

American Machinist
SPECIAL REPORT
NUMBER 352

Hole boring is a serious shop problem. As holes go beyond four diameters deep, straightness and concentricity make the operation even more complex. During WWII, German industry advanced trepanning methods which seemed to hold the answers to production boring problems. Since the war a number of individual American metalworking plants have improved and advanced these techniques until, today, floor-to-floor time has been reduced 90% for boring diameters of 2 in. and larger. An operation that formerly required 16-20 hr. is now completed in 2 hr. Meanwhile, deep-hole drilling has greatly speeded the boring of diameters under 2 in.

Bethlehem Steel Co., at its Bethlehem, Penna., plant, is doing an outstanding job of applying these methods. Here, in pictures with captions, is the story of Bethlehem's development trials, experience, and practice.

By WM M. STOCKER, JR., ASSOCIATE EDITOR



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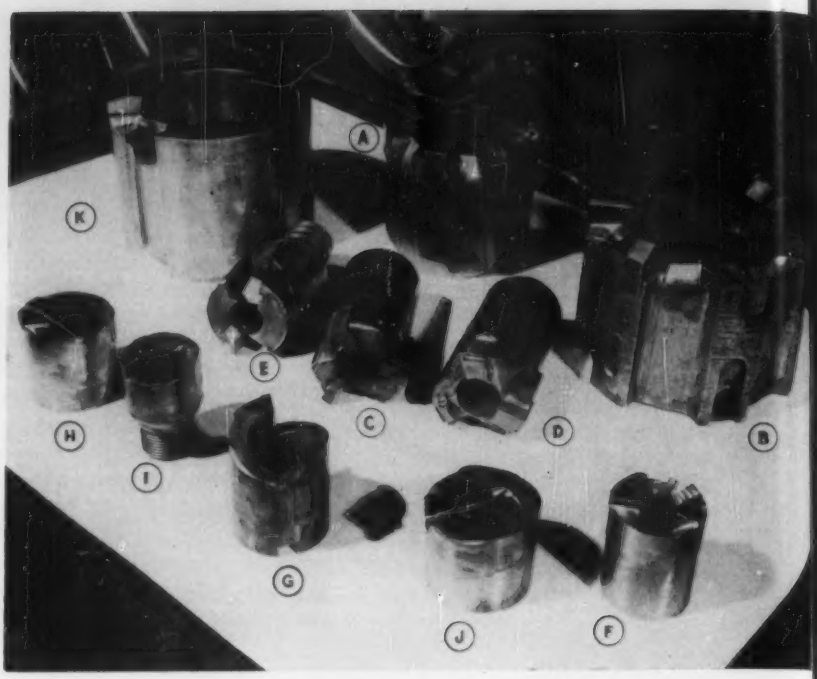
TREPANNING CUTTERS take many forms; are designed with from one to six cutting tools. Most of these designs are only experimental and were developed prior to the tools now used. *A* and *B* each use 6 mechanically held hss tools and these heads were welded to the boring bar — were difficult to remove and replace. *C* and *D* are three-cutter heads with each blade mechanically held. This head style showed no advantage over simpler methods. *E*, *F*, and *G* are two-cutter heads. *E* uses a stepped tooth cutter to keep chips small while *F* accomplishes the same object by using one straight and one grooved cutter, alternately cutting serrations and shaving them off. *G* is similar to a 2-blade shell endmill. With all three heads it was difficult to maintain consistent results. *H*, *I*, *J*, and K are single-cutter heads. *I* and *J* are gun-drilling heads rather than trepanning heads; they produce no core. Except for *J*, all of these heads contain two support bearings or wear-pads. None of the multi-blade heads have this detail. Single cutter heads were found most practical for production of smaller diameters, to 4 in. or 5 in. and a six-blade improvement on the heads shown, developed through the cooperation of Mesta, is used for larger diameters



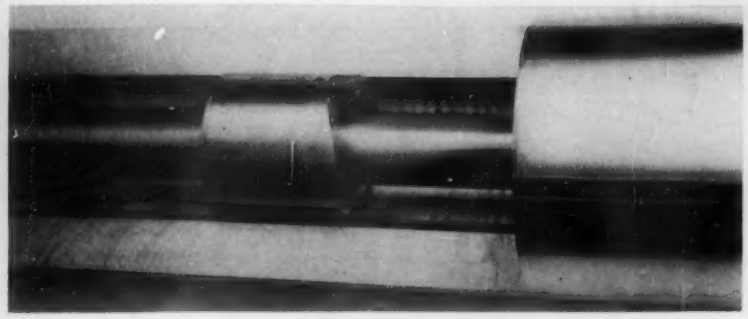
trepanning depends on good tool design...

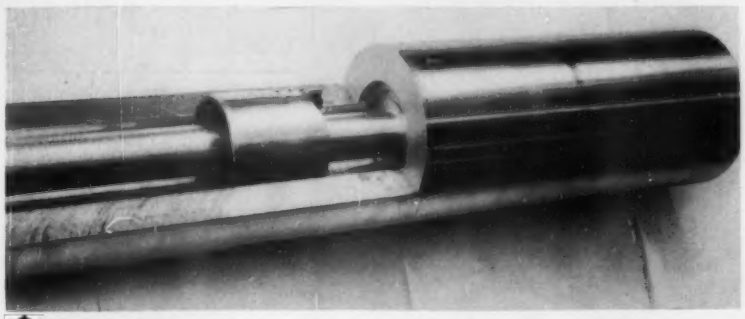
TREPANNING is similar to gun-drilling, the major difference being in the gun-drill removing all of the material as chips while the trepanning cutter produces a solid core from the bore center. The latter is accomplished by cutting an annular groove which separates the core from the bar. Once started, the trepanning tool is self-piloting so that if properly designed and fed, it will cut a reasonably straight hole for any distance. The essentials are cutter design, proper application of coolant, feed per revolution, and rigid support of boring bar and work. Either the tool, the work, or both (differential speed) may be rotated.

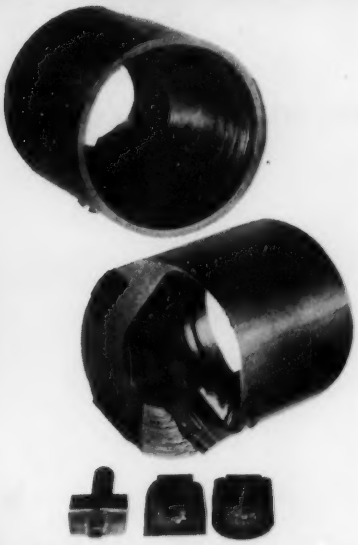
Bethlehem Steel Company manufactures many products which require deep holes having diameters which range from small to very large. Trepanning is the logical way to produce these holes, hence Bethlehem devoted considerable attention to improving the accuracy and speed of this method. A forerunner of present practice, one job was run on a turret lathe at 900 rpm and 0.007 ipm feed, boring with an English-style carbide-tipped trepanning tool at 6.3 ipm. Only three tools were needed to complete an order of 500 pc, each having a 1¼-in.-dia hole, 6-in. deep. This operation led to a broader concept of tools and their application.

The developments moved rapidly. A 30-in. boring lathe was converted for trepanning. Modification included 50 hp dc motor for higher speed and power, new feed gears, high pressure coolant pump and magnetic filter, plus boring bar support and packing gland. First job was a 2.4-in.-dia hole, 8 ft 7 in. long, trepanned at 630 rpm and 4½ ipm feed in 25 min. Next attempt, trepanning a 30 ft drill collar, brought the first serious trouble. High-frequency vibration in the bore broke three cutters. It was cured by adding a second support to the boring bar. A later job showed coolant leakage and a new packing gland was designed to solve the problem. Meanwhile cutting tools were being improved.

In recent years many hundreds of bars and forgings have been trepanned, with troubles overcome as they occurred. Now, six more machines are in operation, one with a direct drive to provide 1200 rpm for small bores. Latest addition has horizontal-boring-mill head mounted on lathe ways to permit turning both tool and work. This machine suggests a whole new range of applications



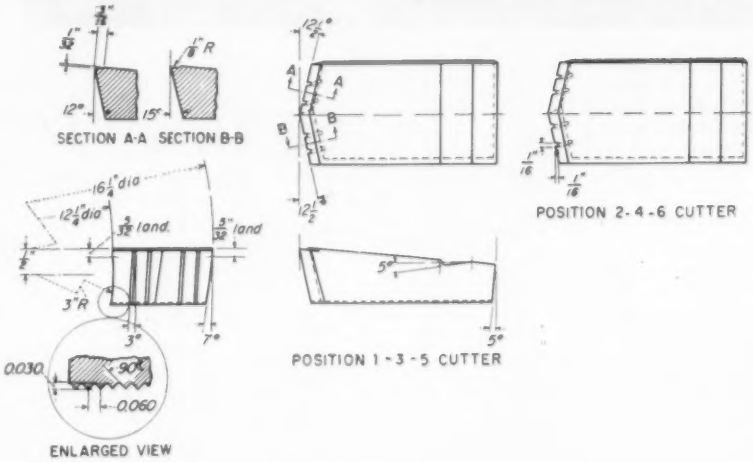




SINGLE-CUTTER TREPANNING head consists of body, mechanically held tungsten carbide cutter, and two carbide bearings or wear pads. Latter are called "bearings" because they must be accurately positioned to balance cutting forces, thus head follows straight path. Note that cutter has 3 steps, to produce 3 small chips rather than 1 large chip which would be difficult to remove

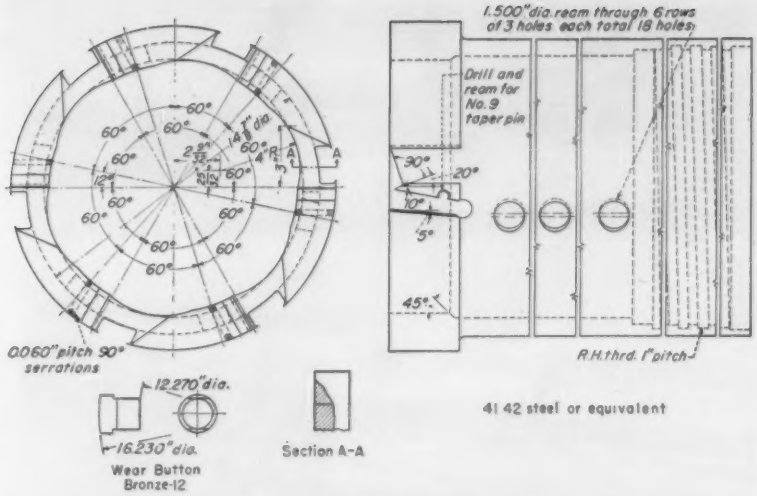
ACTION OF TREPANNING HEAD is shown by cut-away views. Head shown is design now in use. Boring bar was removed. Core passes through head and bar as head progresses and chips are flushed out through bar along with core. Head is threaded onto boring bar

CHIPS TELL THE STORY; are extremely important as indicators of proper cutting and a hazard when improperly handled. Tools and chip breakers must be designed to produce a small, tightly curled chip such as those in the pile (left). Improper design or application will cause chip-jamming and chips, unable to escape, will fuse into solid blobs (right) breaking cutters and spoiling work

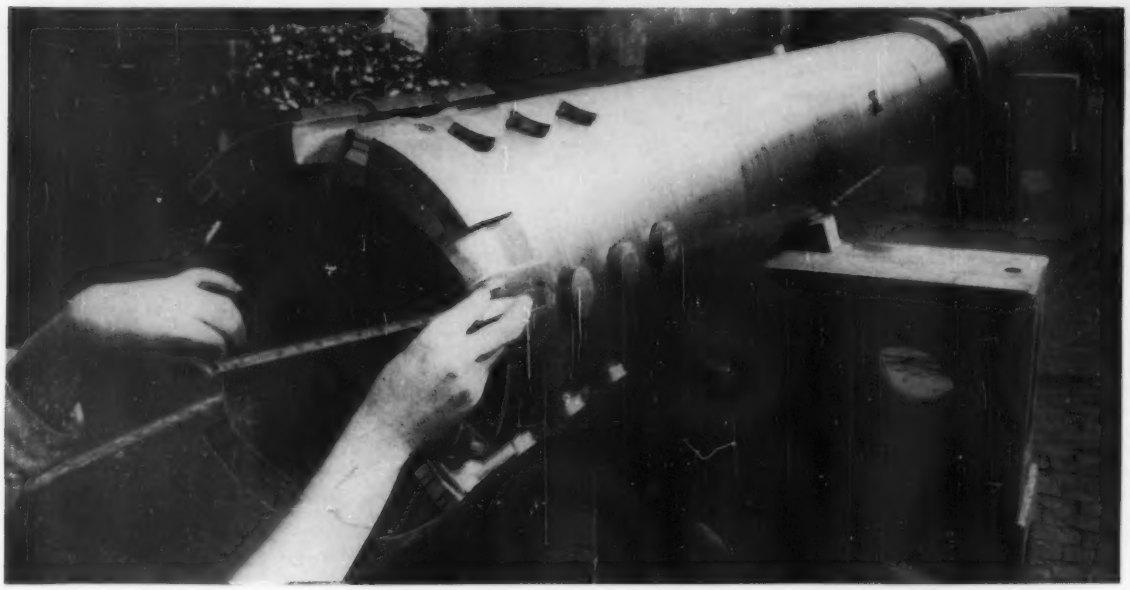


HIGH-SPEED STEEL CUTTERS for 6-cutter head (large dia trepanning) are mechanically locked in tool body by serrations on bottom and wedge pin on top. Chip-breaking grooves are staggered on alternate cutters to reduce size of chips. Cutters are shaped to suit head diameter. Bar feed is 6 times that for single-cutter heads

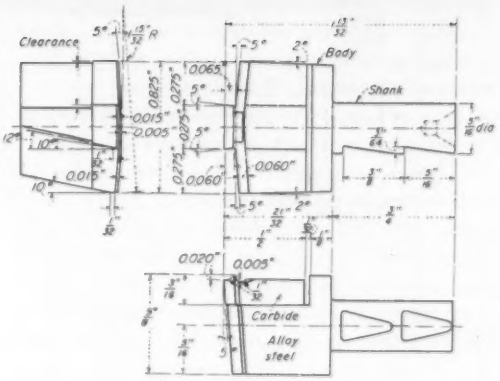
attention to chip control . . .



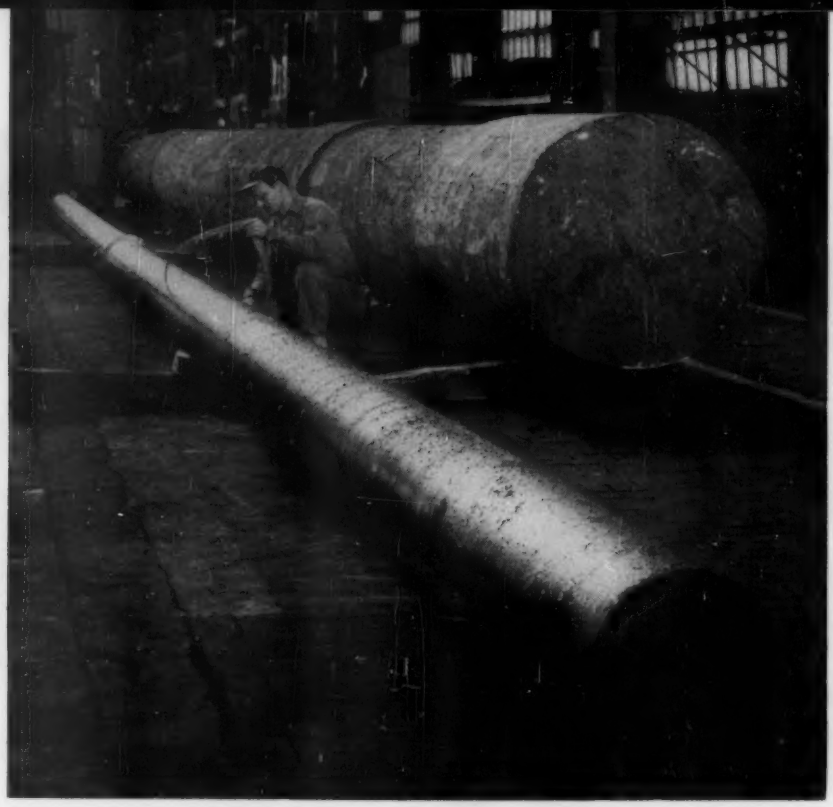
6-CUTTER TREPAN BORING HEAD is entirely different design from that used with single cutters. Bronze buttons are used as wear pads, 3 behind each cutter. Coolant enters around core and flushes chips out around boring bar. Thus, gland is eliminated



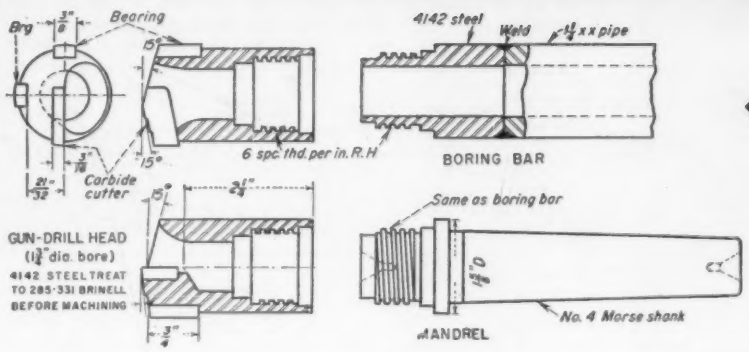
GIANT TREPAN HEAD AND BAR, 12¼ in. ID x 16¼ in. OD x 55 ft long utilizes 6 hss cutters and bronze wear pads (round buttons). Cutters are still stepped to produce small chips. This is design developed by Mesta. Head is steel, boring bar is steel pipe, coolant enters through bar and chips are removed around bar. Trepans at 18 in. per hr press column forging 70 ft long. Boring 35 ft from each end, bores met in the middle within 1/16 in.



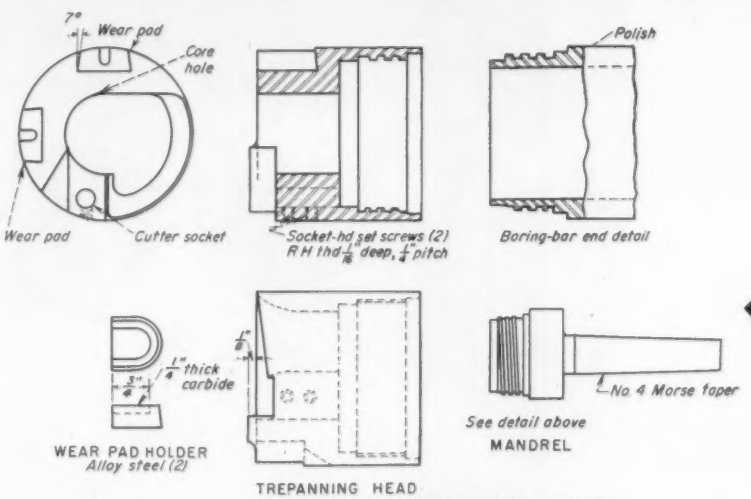
BRAZED CARBIDE TREPAN CUTTER for 2 15/16-in.-dia bore. Setscrews in head clamp shank at indentations. Carbide is brazed to tool body with a silver-clad copper shim. ***Fine "wire" in chips*** was eliminated by grinding inside corners of dovetail to a sharper angle. Tool is successfully used at speeds up to 1200 rpm. Feed averages 0.006 to 0.008 ipr. 1/32-in. clearance between carbide and body reduces shock and vibration in carbide



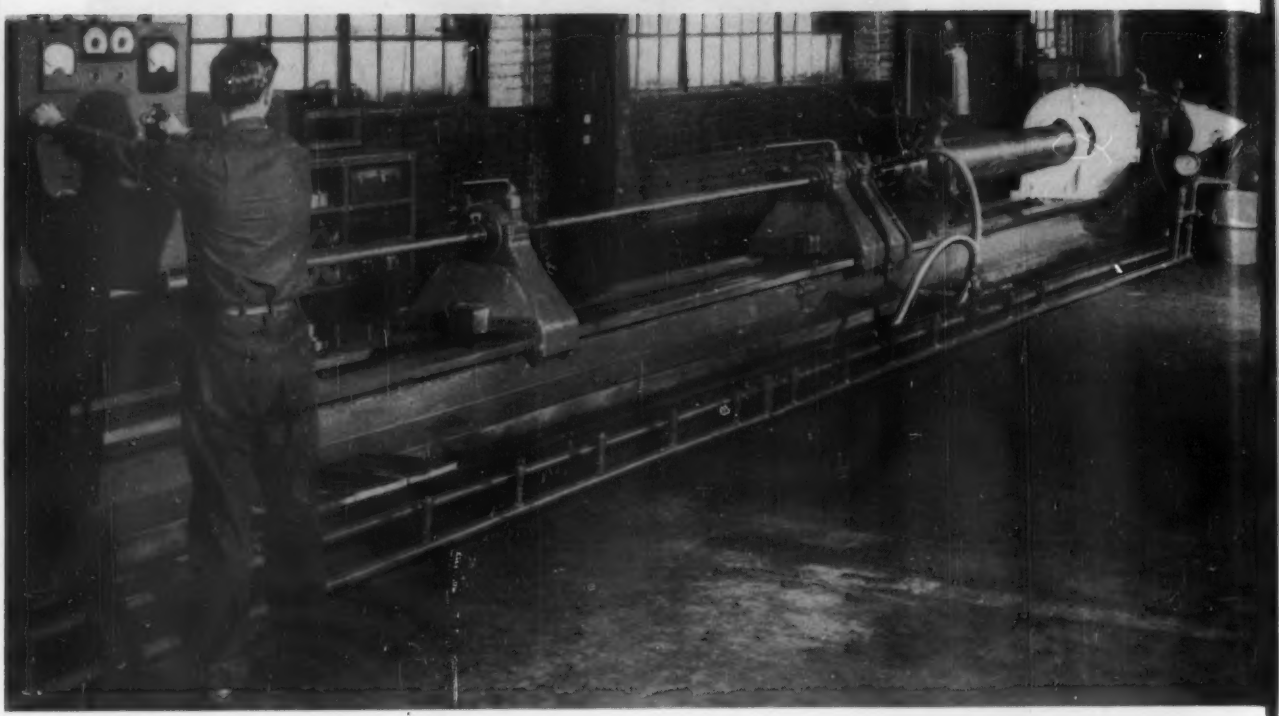
12¼-IN.-DIA CORE trepanned with 6-blade head and (background) forging ready for boring. Block boring, original method, proceeded at 2 in. per hr or 18 days, three shifts each, to complete one bore—now done in two days



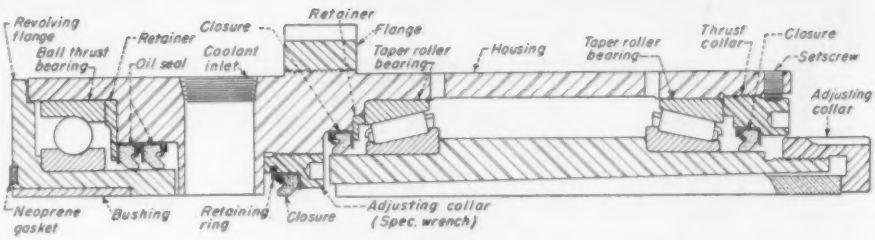
GUN-DRILL HEAD is used for diameters from ½ in. to 2 in. Coolant enters around head, flows over cutter, and flushes chips out through boring bar. This head produces no core, all metal is removed as chips. Note that carbide cutter nose is off-center to cut away center without drag of dead spot. Carbide bearings distribute cutting forces to make head self-piloting in straight line. Boring bar provides torque, not direction



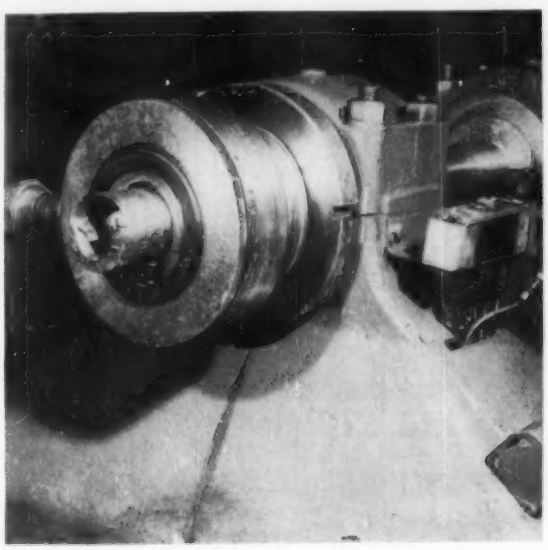
TREPANNING HEAD for intermediate sizes utilizes single Carboloy Grade 78 cutter and 78-B wear pads; is made from 4142 alloy steel core. Socket-head setscrews lock cutter in place. Square thread secures head to boring bar. Mandrel is used to measure and set tool. Coolant enters around bar; chips and coolant exit around core, thru bar



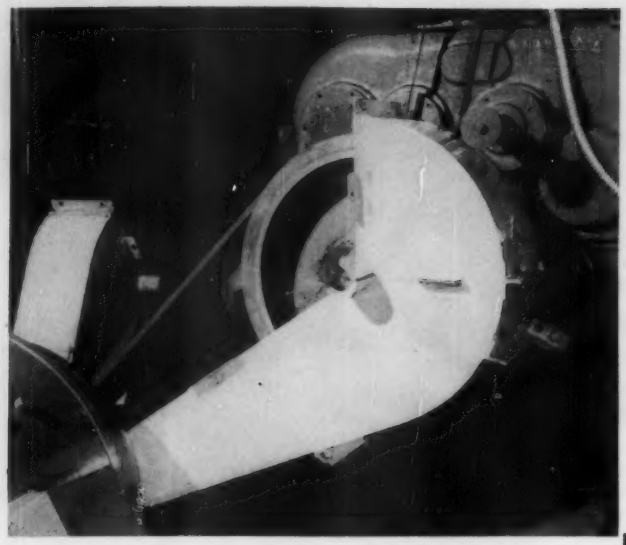
REVOLVING BAR SUPPORT (½ cross-section) is used when trepanning tool is rotated, hence the roller bearing assembly. When the bar simply slides within the support only a bronze bushing is needed in place of roller assembly. All styles are equipped with revolving flange and neoprene gasket to seat against end of workpiece. Coolant enters as shown at 175-300 psi pressure and closures prevent its escape



correct feed at any speed + coolant



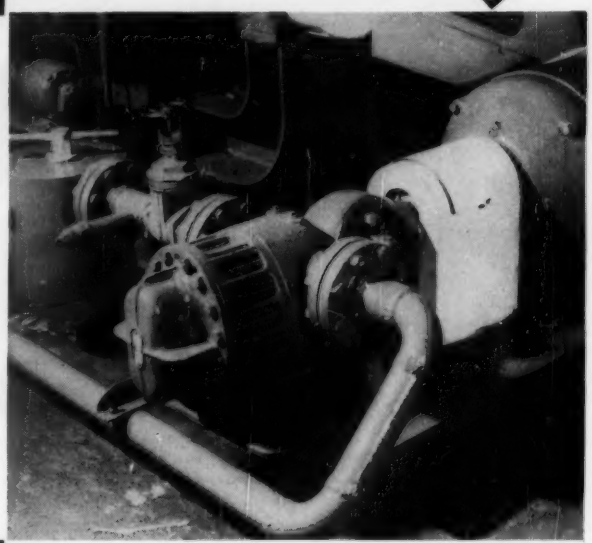
COOLANT GLAND contains a revolving flange which seats snugly against face of workpiece to introduce coolant into the bored hole around the outside of the boring bar. Gasket seals coolant in; forces it to return through the hollow bar

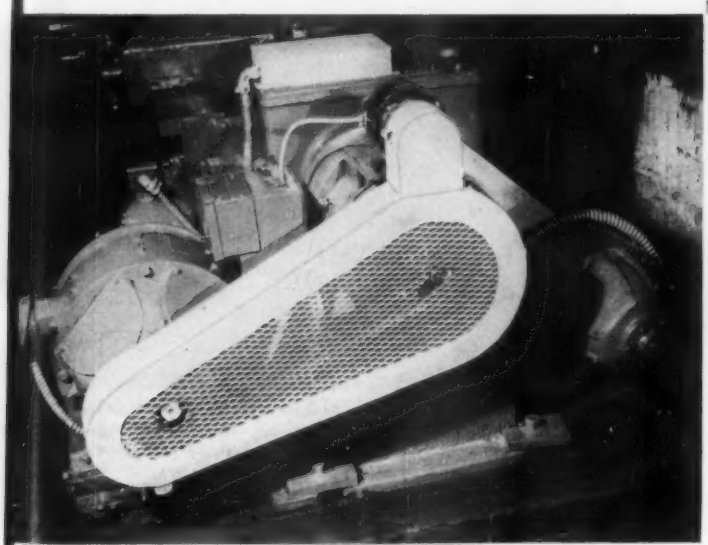


DIRECT DRIVE from 75 hp dc motor was installed on 41 in. boring lathe by removing gearing and building new spindle. Machine was reinforced to permit drilling relatively small holes in heavy workpieces. Drill collars were successfully bored at 900 rpm and 6 to 7 ipm feed. A smaller lathe was speeded up to 1200 rpm and is used on all small bores in lighter workpieces

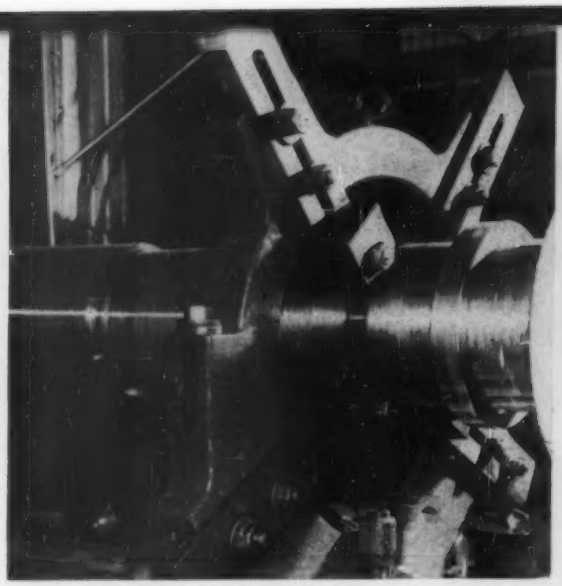
HIGH-PRESSURE COOLANT SYSTEM (175-300 psi) is necessary to flush out chips and cool tool. A 150 gpm gear pump, 30 hp motor, was installed on each trepanning lathe. A magnetic filter was added when small metal particles were found to be damaging gear-pump. Water-soluble oil coolant is used

FIRST CONVERSION for trepanning was a 30 in.-boring lathe which had a 25 hp ac motor and drive ratio of 3.8 to 309 rpm with feeds of 0.013 to 0.078 ipm low and 0.091 to 0.546 ipm high. Without rebuilding headstock, a 50 hp dc motor was installed in place of the 25 hp motor. Higher ratio gears were installed to increase feed range. High-pressure coolant pump was added (with 35 hp motor) and first job was run at 630 rpm and 4½ ipm feed. A hole 8 ft 7½ in. 1g x 2.4 in.dial was bored in 25 min. drilling time. While the headstock was knowingly over-loaded only one small shaft sheared after a year of operation. Lathe shown includes refinements to date

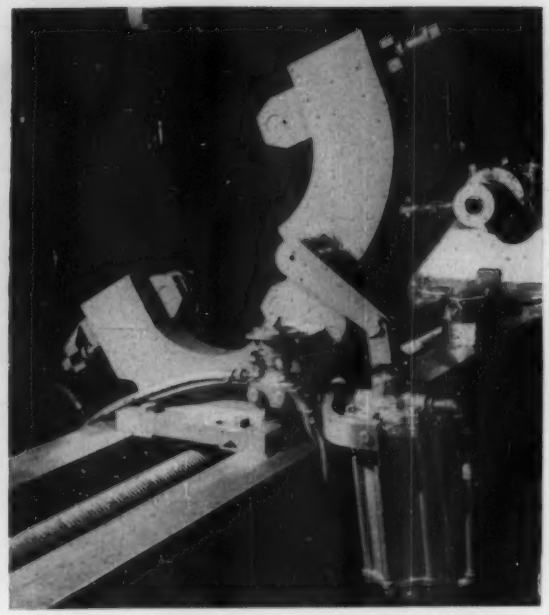




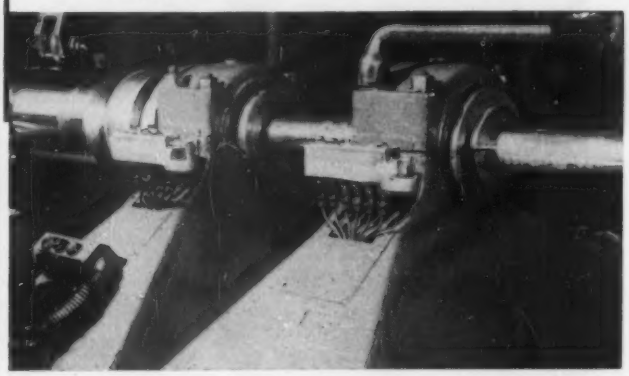
FEED PER REVOLUTION is most critical factor in trepanning. It varies with material but is fairly constant for any specific metal. Feed and rapid traverse assembly were installed to provide high rate not originally available on lathes. Chip load should be 0.006 — 0.008 ipr for 4142 and similar alloys, regardless of speed. Feed drive should be independent of speed



CONVENTIONAL STEADYREST is used to support outboard end of bar to be trepanned. Roller supports are used to permit higher speeds. In this setup work is rotated and cutter is stationary. However trepanning tool can be rotated when size of work makes it more practical. Rotating work does tend to centralize bore when this is a problem

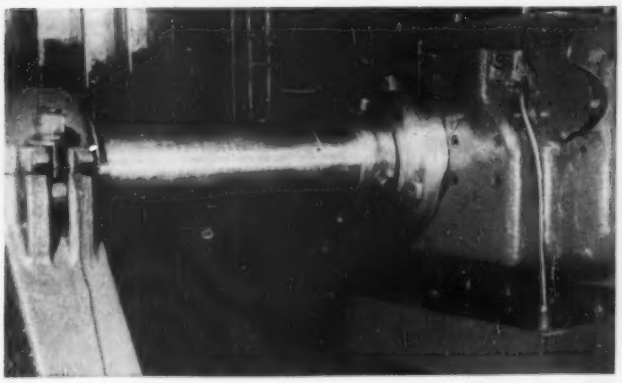


PNEUMATIC STEADYREST has self-contained actuating cylinder and control valve to speed loading and unloading of work. Note roller supports instead of pads. When drilling at these speeds setup time becomes an important segment of floor-to-floor time. Safety, too, is improved with this accessory

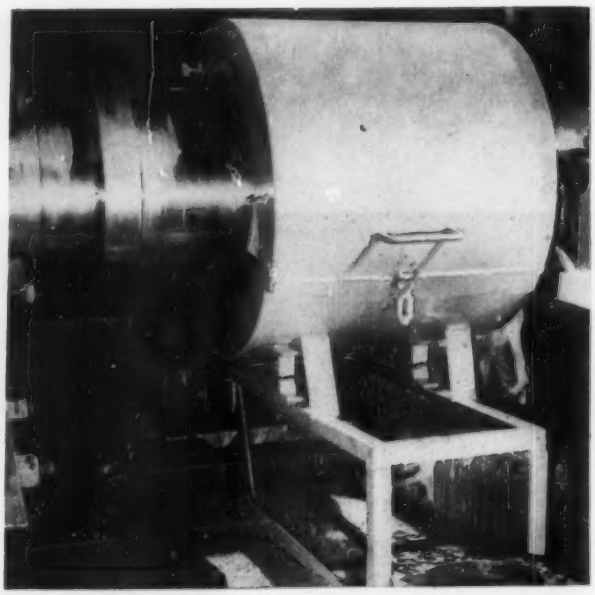


HIGH-FREQUENCY VIBRATION was eliminated by adding a second support, tightly clamped to the boring bar, and shifting this support to provide the most effective dampening. ***Bar slippage*** was cured by changing the chip breaker and fastening a second gripper bushing onto the boring bar

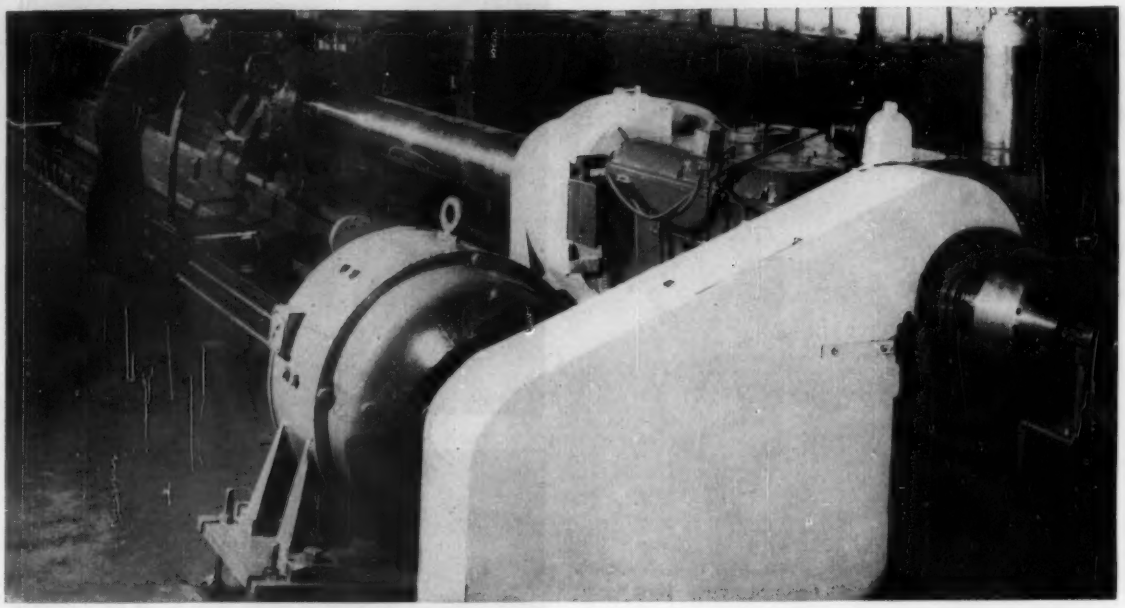
accessories



BORING-MILL HEAD drives trepanning cutter at 275 rpm and 6 ipm feed. Lathe headstock turns work at 190 rpm. One job, weighing 38,380 lb and Ni-Cr-Va-Mo steel, was trepanned 16 ft 8⅝ in. at 1½ ipm feed (0.0075 ipr) and total runout was 0.066 in. Boring head has 15 hp motor. This is still used experimentally; probably will have boring speed increased

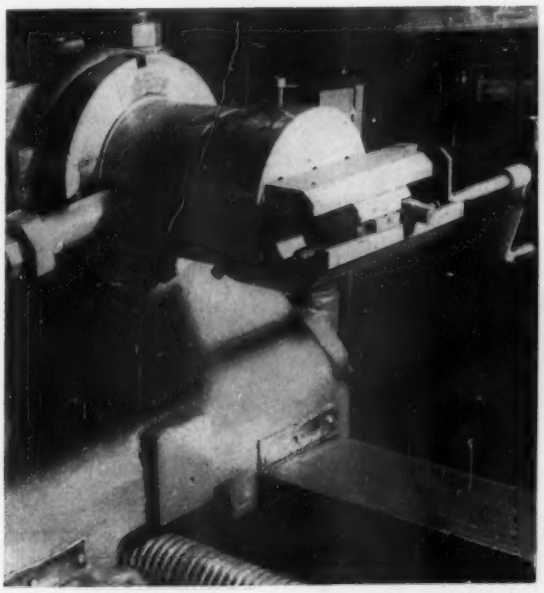


CHIP AND COOLANT GUARD is necessary as the two leave the bore in sizable volume and pressure; are also slung by centrifugal force of rotating work. Guard directs flow to settling tank at rear of machine; surrounds end of work and coolant gland

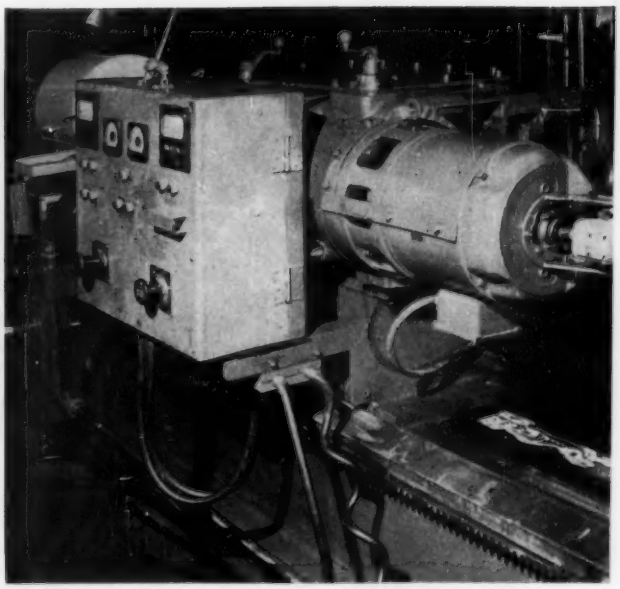


HYDRAULIC CHUCK, actuated by cylinder at right is used to clamp and drive workpiece. Multiple V-belt drives spindle direct from dc motor to rotate workpiece. Boring bar does not rotate

save time, trouble...

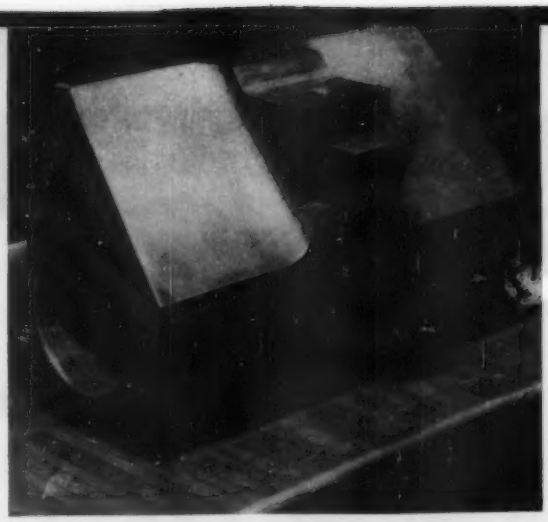


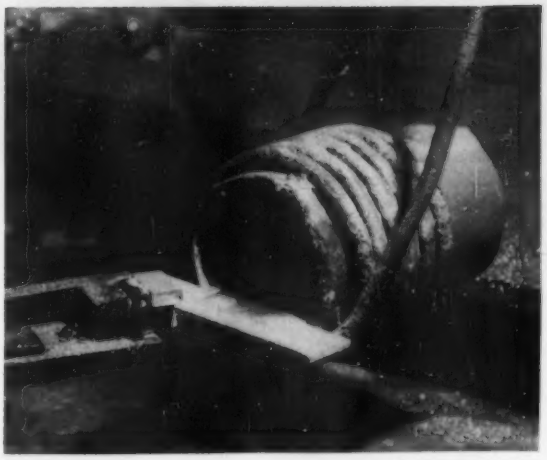
SPECIAL FACING TOOL clamps directly on coolant gland to face and bore end of workpiece prior to starting treppanning head. Face must be square and smooth to provide good coolant seal at 300 psi. Starting bore must be accurate as it guides initial direction of trepanning head. Originally, these operations were done on another lathe, then piece was transferred to trepanning setup. Facing tool is carbide



MAXIMUM ACCURACY AND SPEED are obtained with special trepanning machine built by mounting a horizontal boring mill headstock and drive onto the boring lathe ways. Thus the boring bar and cutter can be rotated opposite to the rotation of the workpiece. This provides a wide range of differential speeds and maximum centrality of bore; is especially useful for large pieces requiring small to medium bores

quality tools... always available

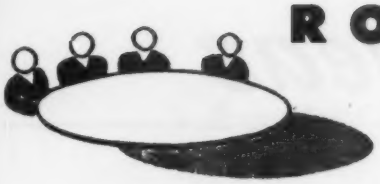




TOOL GRINDING BLOCK *(top)* saves time and errors. Cutter is mounted in block as in trepanning head. All tool angles are on block hence it need only be placed or tipped on surface-grinder magnetic chuck to produce angles on cutter

SANDWICH BRAZE, utilizing induced heat, is standard mount for all carbide cutters. Constantin was tried as a cushion shim but silver clad copper proved more satisfactory. A 1/32-in. gap, or clearance, is provided between the carbide and the shoulder behind it

TREPANNING HEADS are stocked, ready for use, in fractional sizes from ½ in. to 7⅛ in. Of course, sizes from ½ in. to 2 in. are truly gundrills. One head is used per bore and as soon as a job is complete, the head is returned to the toolroom for reconditioning and storage. Most cutter heads and boring bars are made from SAE 4142 cores taken from previous operations



ROUND TABLE

Overtime Gov'mint

"Here's a problem for you, Ed: Miller came over this morning and asked for some time off. Then he asked for permission to use company machines to make up a model of some invention or other he's working on."

"What did you tell him, Al?"

"Well, I told him 'No', but I also said I'd ask around and see if we couldn't work something out. What do you think?"

"Same thing, Al. 'No' it is. If you gave him an ok there'll be seven guys swarming all over you for the same thing tomorrow morning."

"I suppose you're right, from a company standpoint; but how about if he worked at night or on Saturday—without the time off? I understand some companies allow a little 'government' work just to keep it from interfering with regular shop work."

"Most of those that do are a lot smaller than this outfit, Al. In a small shop you can do it, but a big factory has to keep an eye on policy; and expenses, too. You know an hour of machine time is worth about four bucks, not counting operator time."

"That's right enough, but maybe this company would do something for employee relations if it worked out some kind of arrangement. How about if Miller paid us a small amount per hour to cover maintenance costs on the machines he uses. I heard some time ago of one company that charged a dollar an hour to let an employee use the shop in off hours. The company didn't seem to suffer much from it, and I know the employees were very happy with the arrangement."

"I'll bet they were, Al. A buck an hour would barely cover the cost of letting the guy into the plant, much less take care of actual expenses."

"But that's not the point, Ed. The company lets employees work off excess energy with equipment they'd never be able to get close to otherwise. It's good publicity, for one thing."

"I'm not sure the company has any obligation to help out employees in off hours, Al. How about these trade schools? I understand some of them have machines available for experimental work."

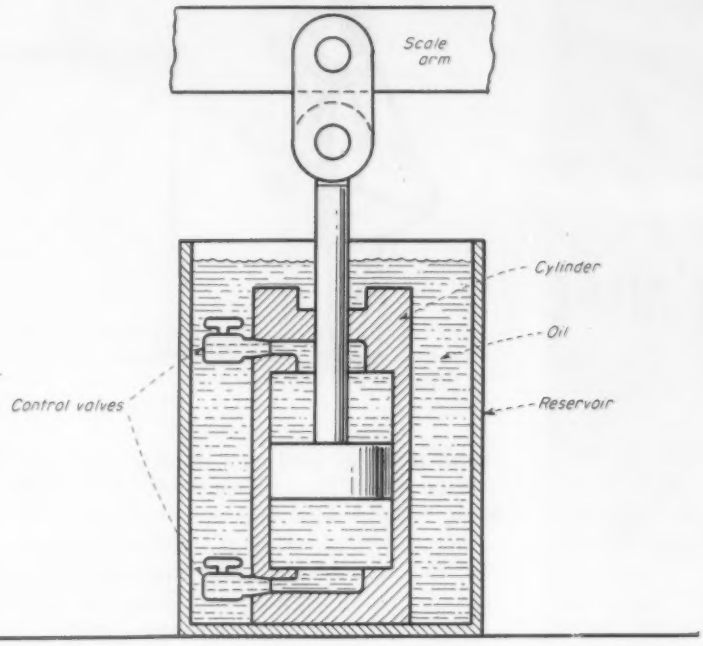
"But not the same kind of equipment we have here, Ed. Besides, a man likes to work with the equipment he's familiar with; that's the advantage of working in your own shop on a hobby or inventive idea."

"Not for me, Al. It's too complicated; and I'm sure management would put thumbs down on it."

"Maybe so, but I think management would be wrong."

CAN A LARGE PLANT afford to let employees use its equipment for private projects? Would the shop gang swarm over the plant on Saturday, or would there be few takers? What experiences along this line have you had? Discussions of earlier topics appear on later pages.

Practical Ideas



Dashpot Dampens Dynamometer Vibrations

In a dynamometer setup we were testing, the load was not smooth, so that the scale was subject to wide variations, making reading of values difficult.

A dashpot from an old discarded oil cylinder solved the problem. Packings and rings were removed from the cylinder, so the piston and rod could move freely. The piston rod was fastened to the scale arm through a flexible link, and the body of the cylinder was placed in an oil reservoir, which, in turn, was fastened to the bed of the machine.

Control valves were put on the ports of the cylinder, to meter the oil and vary the "stiffness" of the setup. This may not be necessary, as, in our setup we found the results satisfactory if the control valves were wide open.

The weight of the piston and scale arm were counterbalanced with counterweights.

It was found that, in actual operation, the dashpot added no measurable friction or hysteresis, the readings coming to the same steady value from either above or below. *Oliver Saari, Schiller Park, Ill*

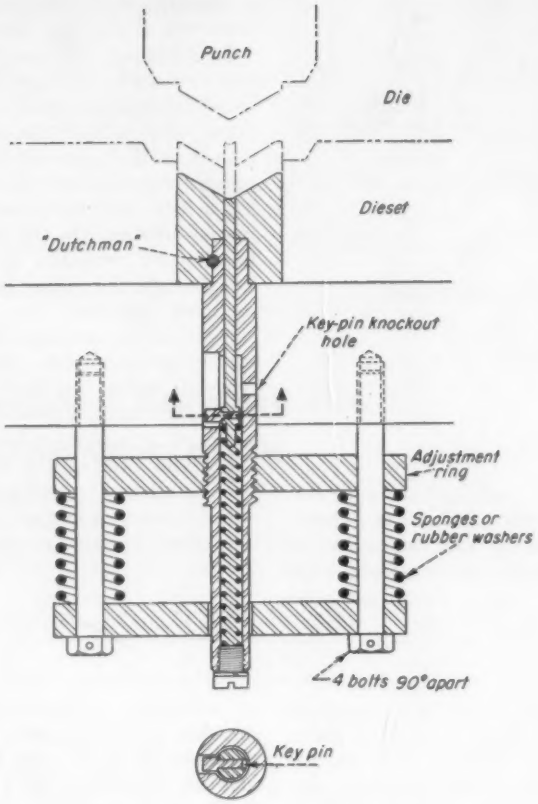
Another Method for Removing Broken Drills, Taps

Another method for removing broken drills, taps, and spindle extensions is to use a drill slightly smaller than the broken part. Grind a straight taper in line with the clearance angle of the drill, and, in the middle of the drill, grind a slot equal to the width of the web of the broken part. Then put this modified drill in the spindle of the drillpress or boring machine and, with the spindle turning slowly, bring the drill sharply against the broken part. The slot will engage with the broken drill and, when the spindle is reversed, the modified drill and the broken part will come out of the work together.

For example of the dimensions, we had a 1⅛-in. drill broken at 4½ in. deep. We took a 1 1/16-in. drill and ground the slot 0.310 in. and 0.590 in. deep. *L R Choudhary, Frankfurt, Germany*

Hand Tapping Angle Iron Speeded with "Brace and Bit"

To speed up tapping on a large number of angle iron frames covered with sheet metal, we came up with two new methods. For small taps (that is, #10 and smaller) we use a ratchet hand screwdriver. We made a set of adapters to hold the taps in the chuck of the driver. For larger sizes we made adapters to hold the taps in the chuck of a regular carpenter's brace. These methods saved us quite a bit of time and reduced tap breakage. The ratchet screwdriver we used made two and a half turns for each full stroke. *George Koslow, Bronx, N Y*



Double-Acting Pressure Pad Aids Part Ejection

This double-acting pressure pad serves two purposes. First, extra pressure is provided on the blank (to prevent shifting) and, second, the formed part is given additional thrust to be sure that it is fully ejected into the air-ejection blast. With this central pressure-pin, we were able to hold dimensions within 0.001 in. on the finished part, and we had no more trouble with jam-ups because of failure of the air stream to completely eject the part from the die.

Incidentally, on this design it will be noted that we secured the push-rod and pressure-pad with a bronze (brazing rod) "dutchman" to lock. This pin is easily removed by drilling it out, a job which does not damage the steel parts. These pins may be peened in place, making a very secure joint. *Gilbert J Bowman, Cleveland, Ohio*

Formula Aids Cutting Double Lead Threads

Internal or external double lead threads can be accurately cut without the help of an index faceplate or turning the stud gear a half-turn to index the leadscrew, because a simple formula will suffice. The formula is:

$$\cot 30 \times (p/2 + f) + \sec 30 \times h = C$$

In this formula, p = pitch of thread; f = width of flat, h = single thread depth, and C = crossfeed adjustment.

For American National threads, set the compound rest at 30° and cut the first thread to proper depth. Then, with the compound rest, back the tool out three or four revolutions, leaving the crossfeed dial at zero setting. With the above formula, a new setting will be found for the crossfeed.

For example, for double lead threads, 8 tpi, the formula becomes:

$$1.732 \times (0.125/2 + 0.0156) + (1.1547 \times 0.0812) = 0.2289$$

Thus, the crossfeed should be moved in 0.229 in. from the former zero setting. (For direct reading crossfeed, double the above value.) Engage the half nut and move the compound rest in until the tool touches the work. Reset both dials to zero and continue with the second thread.

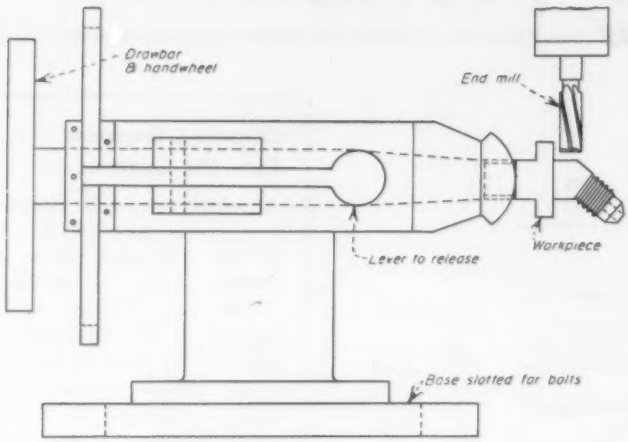
For internal threads, the compound rest is run in three or four revolutions and the crossfeed backed out the amount indicated by the formula. Continue as before. *H W Holmdahl, Honolulu, T H*

Chipping Hammer Cuts Oil Grooves

A recent article in Practical Ideas—*AM* Aug 17, '53, described a splayed chisel for cutting plates and tanks.

The same principle can be applied to the machining oil grooves on machine beds.

The middle section of the chisel is ground to the required shape and the chisel fitted to a chipping hammer. Oil grooves can be quickly, easily, and accurately machined this way. *P V Dunn, Johannesburg, S Africa*

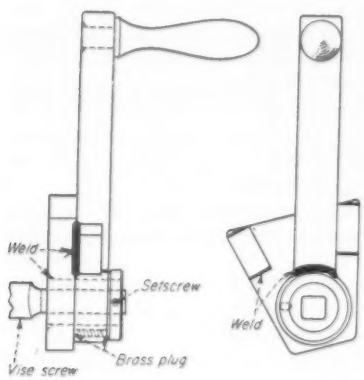


Indexing Head To Mill Square Ends

We had to machine a square on a large number of small aircraft fittings. These fittings had threads on each end, and were elbow-shaped, so it was impossible to straddle-mill. At first we put the elbow in a dividing head and indexed it four times to mill the square, but we had to make 40 revolutions on the dividing head to index the elbow into position.

To speed up the operation, we took the revolving head off an old valve grinder and made a 9/16-in. brass collet to hold the elbow. We then took the gear off the valve grinder spindle and, in its place, put a 9-in. disk with four equally spaced notches. On the side of the spindle we mounted a lever to lock the spindle in any of the four required positions.

Next we mounted the head on a surface-ground plate and milled two slots in the plate for hold-down bolts. The head was bolted to the table of a high-speed end mill. After end milling the square on several elbows, we found we had saved 2 minutes per elbow on this operation. *Irving Epstein, Seattle, Wash*



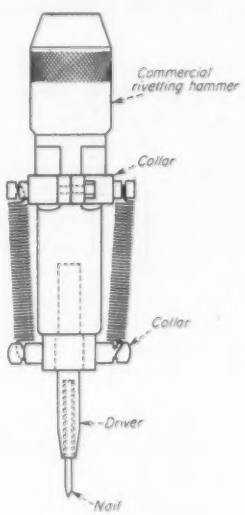
One-Piece Hammer and Crank Tightens Milling Vises

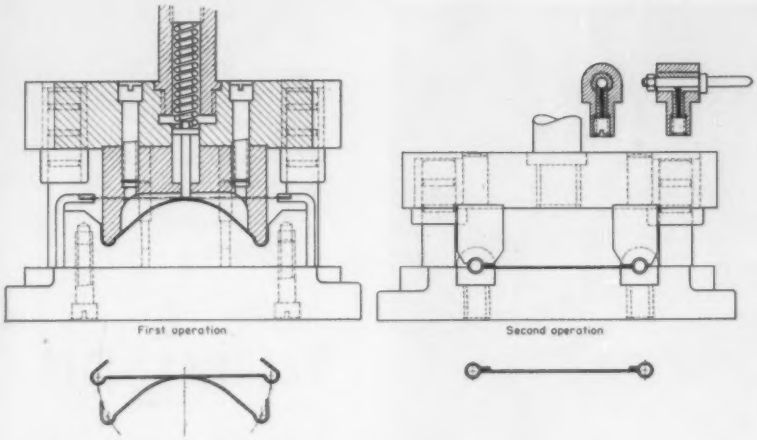
Most toolmakers and machinists will hammer on the handle of a milling machine vise to lock the work securely. Then it is necessary to loosen the vise with a hammer. To save time, we have what we call "hammer-handles." These handles consist of a sleeve drilled and filed to fit the square end of the vise screw. On this sleeve are welded a plate and two striking blocks. The crank is a length of square stock on one end of which is welded a sleeve, and, on the other end is welded a handle. This crank assembly is held in place with a collar and setscrew. A hole in the crank sleeve holds a spring and two brass plugs, which serve as a brake and to keep the handle firm on the inner sleeve.

A few quick blows on the handle, when it has been snugged up to the work suffice to tighten the work securely. The device saves a little time each time it is used. *Henry Gifford, Bronx, NY*

Riveting Hammer Drives Nails to Depth

Often it will be necessary to drive nails to a certain depth, to prevent breaking through the back surface of the work, and, also, it may be desirable to reduce fatigue on this sort of work. Both needs are satisfied by making modifications to a common commercial riveting hammer, including a series of toolholders for different jobs, and an adapter to join the toolholder to the hammer. The depth of penetration is governed by the length of the toolholder. *G Collinson, Herts, England*



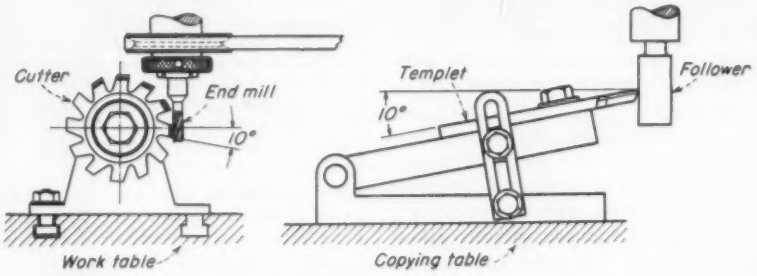


Redesigned Bending Die Cuts One Operation

In making 0.020-in. stainless steel clips, it was customary to form the workpiece in three steps. First the ends were bent upward at 90° to the body of the work. Then the ends were bent over to about 125°, and then finally bent together.

This job was simplified by redesigning the first operation die, which combined the first two steps. Instead of simply bending the ends vertical, the part was bowed, and then the ends were formed, so that, when springback occurred (the part was flexible), the ends were sufficiently bent that the job could easily be finished in one further press operation.

In the first bending die, the part is located between two locating plates and rested against two steel pins. As the ram descends, the pin in the center of the punch first contacts the work, holding it firmly in place. Then, as the ram descends further, forming takes place so that the ends are at 90° to horizontal, but the work has been bowed, so the ends are actually at about 125° to horizontal. The second bending die easily catches the ends of the work and bends them over steel pins, completing the job in one step. In the second die, the steel forming pins are allowed to move up or down slightly in split bushings, being held in place by springs. *H Dahl, Sweden*



Tilted Templet Reproduces Correct Form for Milling

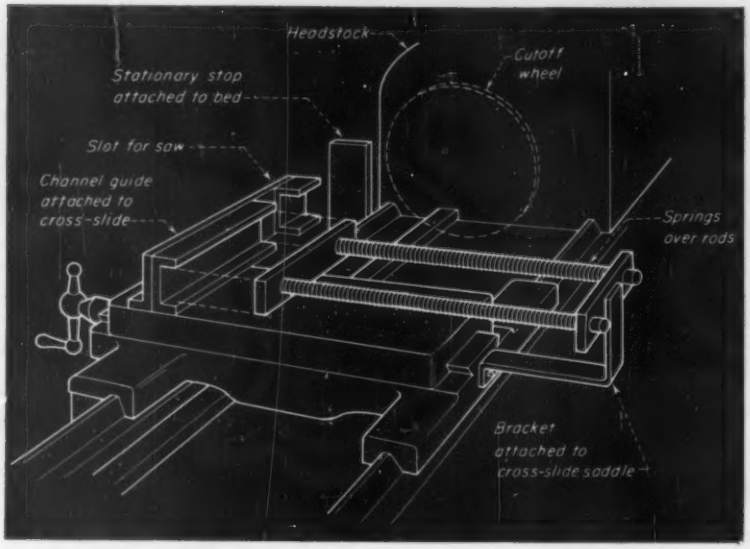
We recently had a large order for form milling to a tolerance of ±0.001 in. We lack the equipment for grinding the form to the required accuracy, so we solved the problem to our satisfaction by cutting the form with a die-sinking machine. We mounted a dividing attachment on the die-sinker, and made a jig-bored templet, using a 10:1 templet ratio.

The form cutter has a relief angle of 10°. To correct for this relief angle on the form of the tool and to permit us to grind the top of the cutter without loss of accuracy, we tilted the templet to 10°, and chamfered the edge of the templet, to give us point contact for our follower. This method gave us a true profile on the component, and we could grind the top of the cutter to sharpen the tool. *H K Fronicke, Somerset, England*

Washer Cutter Forms Emergency Belts

Recently the fabric driving belt on our toolpost grinder broke, and we had no replacements. Because we were in a hurry for the machine, we tried several improvisations, but none of them worked until we hit upon a successful idea. We took a piece of rubber (neoprene would do as well), about ½-in. thick and 6-in. square, and tacked down the four corners to a flat surface. Then we obtained a washer cutter (the kind commercially available in hardware or machine shop supply houses, which mounts on a drill-press). This cutter consists essentially of two blades, adjustable, mounted on a fly-bar.

Setting one cutter to the required diameter of the belt and the other cutter to a diameter about 3/32-in. larger, we cut the finished product in a drillpress. The piece of rubber or neoprene left over will be useful elsewhere, and the belt is quickly and easily made. *William Adams, Bayside, LI, NY*



Modified Screw-Machines Speed Stock Cutting

Using our only hand-miller for the job, we were cutting a large number of short pieces of extruded aluminum stock. As production was not satisfactory on one machine, we decided to modify two hand screw-machines for the job.

First, we machined arbors so that we could mount cutoff saws in the spindles, then we made fixtures as shown, which mounted on the cross-slide. The turrets were removed from each machine and the fixtures were installed.

The fixture consists of a channel to locate and guide the stock and a stop for gaging the length. The stop is stationary and is fastened to the bed of the screw-machine. Extension members were fastened to each side of the cross-slide saddle and to these members was attached a block which carried a spring. Guides were provided to support the outer end of the stock.

The stock was fed along the channel up to the stop. Then the cross-feed was advanced by using the hand-lever and the stock was fed against the saw blade. However, as the stock moved toward the saw, it was forced against the side and clamped in the channel by the pressure of the spring-loaded shoe. *Henry George, Bronx, NY*

Brazing Lathe Wrenches For Convenient Use

We find it difficult, in spite of instructions and rules, to keep the proper lathe wrenches together at each lathe. To make this a little easier, we brazed the toolpost wrench and the toolholder wrench together. This doesn't interfere with their use, but it does make it a little handier. The operators usually leave the toolpost wrench on the toolpost or carriage lock-screw. There is no such convenient or "natural" spot for the toolholder wrench. But when brazed together, both wrenches are together, and handier to use.

Joe Dalton, Bronx, N Y

WINNER NO. 189
OF
$25 IN ADDITION TO REGULAR PAYMENT
In Oct 26, 1953
CLIFFORD MOLLOY
BRONX, N Y
LATHE GENERATES PARABOLIC CHUCKS

for the best PRACTICAL IDEA

An extra payment of $25 is made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of issue. The winner will also be announced in these pages as soon thereafter as practicable.

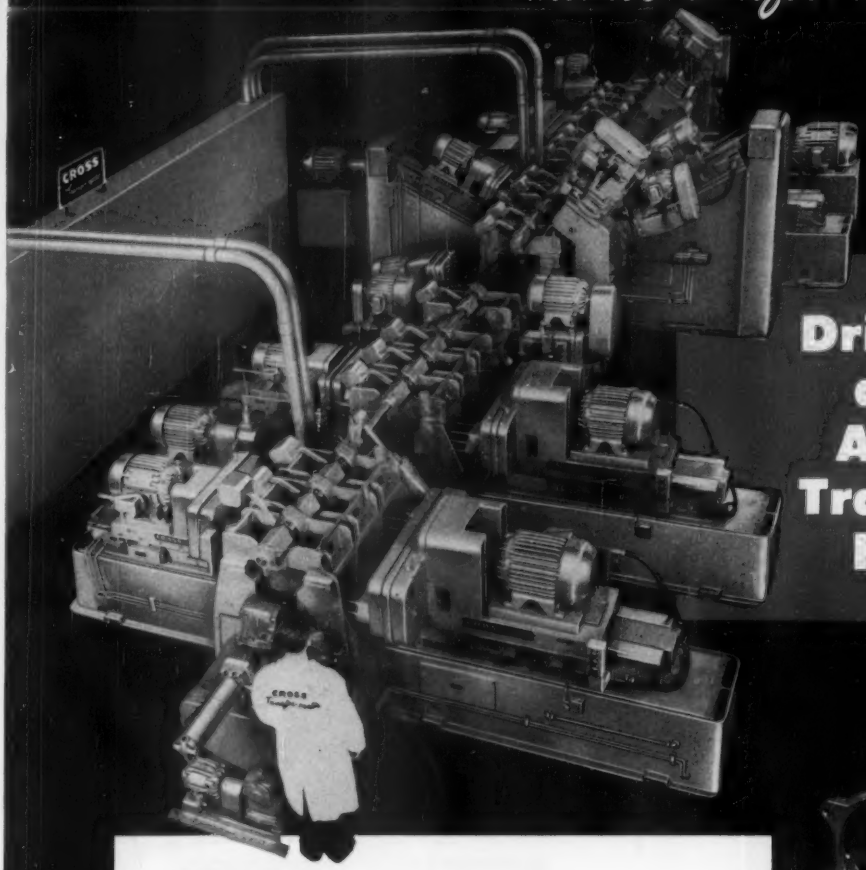
JUDGES—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co, Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

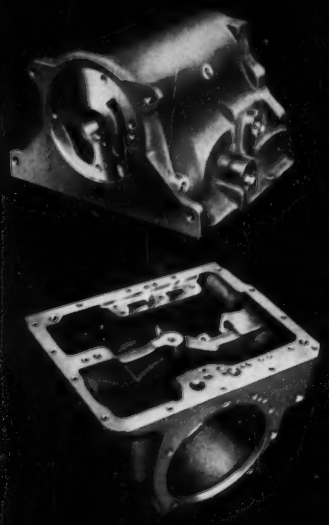
HOW TO ENTER—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St, New York 36, N Y.

Another Transfer-matic by Cross



Drills, Reams and Taps Automatic Transmission Housings

- ★ 29 stations.
- ★ 78 operations—30 drilling, 12 chamfering, 4 end milling, 3 counterboring, 14 reaming, 15 tapping.
- ★ 100 pieces per hour at 100% efficiency.
- ★ Automatic 90° indexing of part in station 14 for drilling sides and top in subsequent stations.
- ★ Pre-set tools and Cross Machine Control Unit with Toolometers for programming tool changes.
- ★ Complete interchangeability of all standard and special parts for easy maintenance.
- ★ Other features: Automatic transfer from station to station; hydraulic feed and rapid traverse; individual lead screw feed for tapping; hardened and ground ways; gravity operated cam clamping; J.I.C. standard construction; built-in chip conveyor.



Established 1898

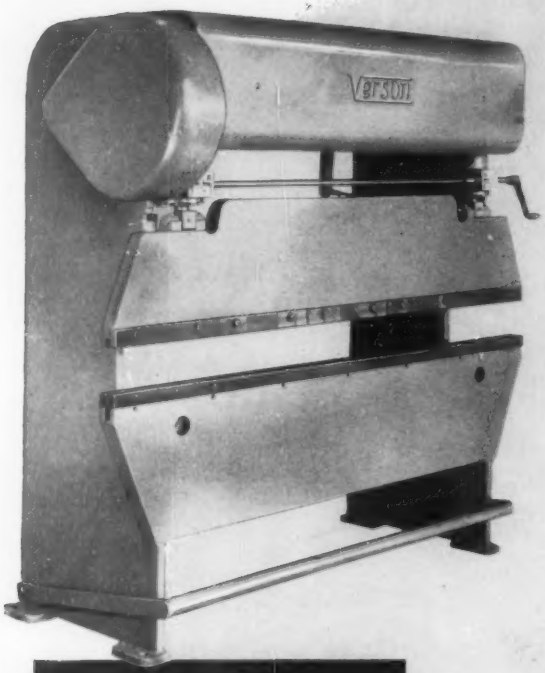
THE CROSS CO.

DETROIT 7, MICHIGAN

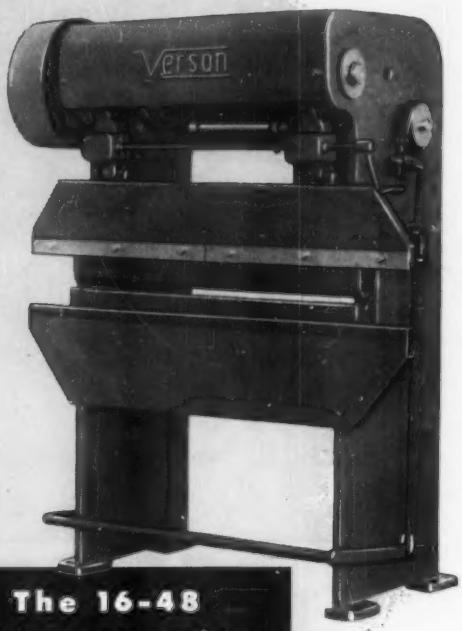
Special MACHINE TOOLS

Now, for the first time...

Standard Verson Press Brakes Available from Stock!



The 1062
25 tons capacity
(16 ga. x 78")
$2,190.00 as shown



The 16-48
15 tons capacity
(16 ga. x 48")
$1,455.00 as shown

Standard Dies Also Available

Standard 90° "V" dies for these press brakes are also available from stock. 78" long set for the 1062 is priced at $124.00. 48" long set for use in the 1062 or 16-48 is priced at $93.00. (Prices are for dies to handle 16 ga.).

To meet the demand for quality press brakes at modest cost and available for prompt delivery, Verson now offers two standard models *from stock*. For the small shop, it means big press standards of design and construction at prices that will fit almost any budget. For the larger shop, it means an economical answer to handling the smaller jobs without tying up big expensive machines.

Important, too, is the fact that you can order these machines as easily as buying an automobile. There is no involved proposal . . . no long delay awaiting delivery. These standard machines are offered at a standard price and shipped from stock.

Your Verson dealer can give you further information or write direct.

A Verson Press for every job from 60 tons up.

Verson

ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

VERSON ALLSTEEL PRESS CO.

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MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES

Spot Welding Aluminum...I

Source: "Recommended Practices for Spot Welding Aluminum and Aluminum Alloys," published by the American Welding Society, 33 West 39th St, New York 18

WELDABILITY CHART FOR COMMON COMBINATIONS OF ALUMINUM ALLOYS

BASED ON EQUAL THICKNESSES	2S-O 3S-O	2S--H12 -H14 -H16 -H18 3S--H12 -H14 -H16 -H18	4S-O	4S--H32 -H34 -H36 -H38	50S--O	50S--H32 -H34 -H36 -H38	52S-O	52S--H32 -H34 -H36 -H38	56S-O	56S--H32 -H34 -H36 -H38 A54S--H32 -H34 -H36 -H38	14S--T4 -T6	AL-CLAD 14S--T4 -T6 HARD-CLAD R301--T3 -T4 -T6	24S--T3 -T4	AL-CLAD 24S--T3 -T4	61S--T4 -T6	63S--T5 -T6	75S--T6	AL-CLAD 75S--T6
2S-O 3S-O	A B C 4 2 1	A B C 3 1 1	A B C 4 1 1	A B C 3 1 1	A B C 4 1 1	A B C 3 1 1	A B C 4 2 1	A B C 3 2 1						A B C 4 2 1	A B C 3 2 1	A B C 3 2 1		
2S-H12-H14-H16-H18 3S-H12-H14-H16-H18	A B C 3 1 1	A B C 1 1 1	A B C 3 2 1	A B C 1 1 1	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1						A B C 4 2 1	A B C 1 2 1	A B C 1 1 1		
4S-O	A B C 4 1 1	A B C 3 2 1	A B C 4 1 1	A B C 3 1 1	A B C 4 2 1	A B C 3 2 1	A B C 4 2 1	A B C 3 2 1		A B C 3 2 1					A B C 3 2 1	A B C 3 2 1		
4S-H32-H34-H36-H38	A B C 3 1 1	A B C 1 1 1	A B C 3 1 1	A B C 1 1 1	A B C 3 2 1	A B C 1 2 1	A B C 4 2 1	A B C 1 2 1		A B C 1 2 1					A B C 1 2 1	A B C 1 2 1		
50S-O	A B C 4 1 1	A B C 3 1 1	A B C 4 2 1	A B C 3 2 1	A B C 4 2 1	A B C 3 2 1	A B C 4 2 1	A B C 3 2 1							A B C 3 2 1	A B C 3 2 1		
50S-H32-H34-H36-H38	A B C 3 1 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1		A B C 1 2 1					A B C 1 2 1	A B C 1 2 1		
52S-O	A B C 4 2 1	A B C 3 2 1	A B C 3 2 1	A B C 4 2 1	A B C 4 2 1	A B C 3 2 1	A B C 4 2 1	A B C 3 2 1							A B C 3 2 1	A B C 3 2 1		
52S-H32-H34-H36-H38	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1		A B C 1 2 1	A B C 2 2 2	A B C 2 2 1	A B C 2 2 2	A B C 2 2 1	A B C 1 2 1	A B C 1 2 1	A B C 2 2 2	A B C 2 2 1
56S-O									A B C 4 1 1	A B C 3 1 1					A B C 3 2 1	A B C 3 2 1		
56S-H32-H34-H36-H38 A54S-H32-H34-H36-H38			A B C 3 2 1	A B C 1 2 1		A B C 1 2 1			A B C 3 1 1	A B C 1 1 1					A B C 1 2 1	A B C 1 2 1		
14S-T4-T6								A B C 2 2 2			A B C 2 2 2	A B C 2 2 1	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2
ALCLAD 14S-T4-T6 HARDCLAD R301-T3-T4-T6								A B C 2 2 1			A B C 2 2 1	A B C 2 2 1	A B C 2 2 2	A B C 2 2 1	A B C 2 2 1	A B C 2 2 2	A B C 2 2 2	A B C 2 2 1
24S-T3-T4								A B C 2 2 2			A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2
ALCLAD 24S-T3-T4	A B C 4 2 1	A B C 4 2 1						A B C 2 2 1			A B C 2 2 2	A B C 2 2 1	A B C 2 2 2	A B C 2 2 1	A B C 2 2 1	A B C 2 2 2	A B C 2 2 2	A B C 2 2 1
61S-T4-T6	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1	A B C 2 2 2	A B C 2 2 1	A B C 2 2 2	A B C 2 2 1	A B C 1 2 1	A B C 1 2 1	A B C 2 2 2	A B C 2 2 1
63S-T5-T6	A B C 3 2 1	A B C 1 1 1	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1	A B C 3 2 1	A B C 1 2 1	A B C 2 2 2	A B C 2 2 1	A B C 2 2 2	A B C 2 2 1	A B C 1 2 1	A B C 1 2 1	A B C 2 2 2	A B C 2 2 1
75S-T6								A B C 2 2 2			A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2	A B C 2 2 2
ALCLAD 75S-T6								A B C 2 2 1			A B C 2 2 2	A B C 2 2 1	A B C 2 2 2	A B C 2 2 1	A B C 2 2 1	A B C 2 2 1	A B C 2 2 2	A B C 2 2 1

LEGEND:

A. Ease of Welding

1. Good welds can be made over a wide range of machine settings
2. Makes good welds but special practices required; can be welded only over narrower range of machine settings
3. Can be welded, but material too soft to obtain consistent strength
4. Difficult to weld; not recommended

B. Precleaning:

1. Easy to clean or may need no cleaning
2. Chemical or mechanical precleaning necessary

C. Resistance to Corrosion:

1. Corrosion resistance of weld zone equal to parent metal
2. Corrosion resistance of weld zone not as good as parent metal

CUT MILLING COSTS WITH

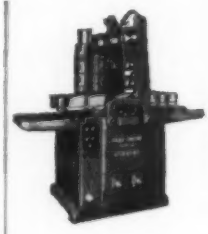
KENT-OWENS

Speed and Accuracy!

More and more—Kent-Owens Machines get the call for countless milling jobs today—because they're *rugged . . . simple . . . versatile.* Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to cutter. Write for bulletins on wide range of hydraulic and hand-operated machines. Also, let our engineers help you with tooling and special machine requirements. Kent-Owens Machine Co., Toledo, Ohio.

No. 2-20
20" table travel . . . 42" x 12" table . . . full automatic hydraulic table feed.

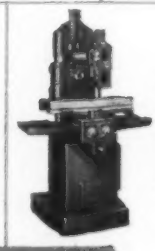
No. 2-20V
20" table travel... vertical spindle with speed range 32 to 1284 R.P.M. . . . 42" x 12" table.



No. 2-20DS
Double Spindle for two milling operations at same time . . . 20" table travel . . . 42" x 12" table.

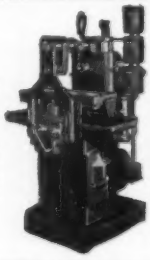
No. 1-14DS
Double Spindle for two milling operations at same time . . . 14" table travel . . . 32" x 9" table.

No. 1-M
Hand feed to table and head . . . 25" x 9" table . . . Adjustable head counter-balance.



No. 1-V
Hydraulic vertical head feed . . . 5½" head travel . . . 25" x 9" table.

No. 1-8
8" table travel . . . 25" x 9" table . . . automatic hydraulic table feed.



No. 1-14
32" x 9" table . . . 14" table travel . . . hydraulic table feed . . . full automatic cycle.

Call on KENT-OWENS for milling machines

KENT-OWENS REPRESENTATIVES

BOSTON — General Machinery Corp
BUFFALO — Don W. Patterson
CHICAGO — Four States Mach'y Company
DALLAS — Hunter Machine Tool Co.
DAYTON — C. H. Gossger Mach'y Co.
DETROIT — A. C. Haberkorn Mach'y Co.
FT. WAYNE — Oasis Machinery Co.
GRAND RAPIDS — Joseph Monahan
HAMILTON, ONT — F. F. Barber Mach'y Company
HARTFORD — Harrington Machinery, Inc.
HOUSTON — Oliver H. Van Horn Co., Inc.
INDIANAPOLIS — Oasis Machinery Co.
KANSAS CITY — Richman Machinery Co.
LOS ANGELES — Germain Mach'y Co.
MILWAUKEE — Four States Mach'y Company
MINNEAPOLIS — The Sunerloe Company
MOLINE — John J. Normoyle Co.
MONTREAL — F. F. Barber Mach'y Co.
NEW ORLEANS — Oliver H. Van Horn Co., Inc.
NEW YORK — Harrington-Wilson-Brown Company
PHILADELPHIA — Calco Machinery Company
PITTSBURGH — Barney Machinery Company
ROCHESTER — P. W. Schiefer Machinery Co.
SAN FRANCISCO — C. P. Buloni Machinery Co.
ST. LOUIS — Blackman & Nuetzel Mach'y Co. Clarke Equipment Company
SYRACUSE — J. F. Owens Mach'y Company
TORONTO, ONT — F. F. Barber Mach'y Company
WINDSOR, ONT — F. F. Barber Mach'y Company

Spot Welding Aluminum...II

WELDING SCHEDULES FOR 3-PHASE EQUIPMENT

THICKNESS "T" (SEE NOTES 1 AND 2 BELOW)	ELECTRODE DIAMETER AND SHAPE (TOP & BOTTOM) (SEE NOTE 3 BELOW)		NET ELECTRODE FORCE		WELD TIME (APPROX.)		WELDING CURRENT (APPROX.)		MINIMUM CONTACTING OVERLAP (SEE NOTE 5 BELOW)	MINIMUM WELD SPACING (SEE NOTE 4 BELOW)	DIAMETER OF FUSED ZONE	MINIMUM AVERAGE SHEAR STRENGTH
					CYCLES (60 PER SEC.)		AMPS.			℄ TO ℄		
IN.	D, IN.	R, IN.	WELD	FORGE	WELD	POST HEAT	WELD	POST HEAT	IN.	IN.	IN. (APPROX.)	LB.
Frequency-Converter Machines												
0.020	5/8	3	500		1/2	NONE	26,000	NONE	3/8	3/8	0.125	190
0.025	5/8	3	500	1500	1	3	34,000	8,500	7/16	3/8	0.140	250
0.032	5/8	4	700	1800	1	4	36,000	9,000	1/2	1/2	0.160	350
0.040	5/8	4	800	2000	1	4	42,000	12,600	9/16	1/2	0.180	460
0.051	5/8	4	900	2300	1	5	46,000	13,800	5/8	5/8	0.210	640
0.064	5/8	6	1300	3000	2	5	54,000	18,900	3/4	5/8	0.250	920
0.072	5/8	6	1600	3600	2	6	61,000	21,350	13/16	3/4	0.275	1130
0.081	7/8	6	2000	4300	3	6	65,000	22,750	7/8	3/4	0.300	1400
0.091	7/8	6	2400	5300	3	8	75,000	30,000	15/16	7/8	0.330	1700
0.102	7/8	8	2800	6800	3	8	85,000	34,000	1	1	0.360	2050
0.125	7/8	8	4000	9000	4	10	100,000	45,000	1 1/8	1 1/4	0.425	2830
Rectifier-Type Machines												
0.016	5/8	3	440	1000	1	NONE	19,000	NONE	5/16	3/8	0.110	145
0.020	5/8	3	520	1150	1	NONE	22,000	NONE	3/8	3/8	0.125	190
0.032	5/8	3	670	1540	2	NONE	28,000	NONE	1/2	1/2	0.160	350
0.040	5/8	3	730	1800	3	NONE	32,000	NONE	9/16	1/2	0.180	460
0.051	5/8	8	900	2250	4	4	37,000	30,000	5/8	5/8	0.210	640
0.064	5/8	8	1100	2900	5	5	43,000	36,000	3/4	5/8	0.250	920
0.072	5/8	8	1190	3240	6	7	48,000	38,000	13/16	3/4	0.275	1130
0.081	7/8	8	1460	3800	7	9	52,000	42,000	7/8	3/4	0.300	1400
0.091	7/8	8	1700	4300	8	11	56,000	45,000	15/16	7/8	0.330	1700
0.102	7/8	8	1900	5000	9	14	61,000	49,000	1	1	0.360	2050
0.125	7/8	8	2500	6500	10	22	69,000	54,000	1 1/8	1 1/4	0.425	2830

NOTES:

1. THICKNESS "T" IS THE THICKNESS OF ONE SHEET OF AN EVEN TWO SHEET COMBINATION
2. TYPES OF ALUMINUM ALLOY - R301-T3(W), R301-T6(T), 24S-T3(W), 24S-T4(T), 14S-T4(W), 14S-T6(T), AND 75S-T6(T) CLAD SHEET
3. WHERE PRACTICAL A SPHERICAL RADIUS IS RECOMMENDED. THIS RADIUS SHOULD BE THE SAME ON BOTH THE TOP AND BOTTOM ELECTRODES FOR LIKE THICKNESSES AND MATERIAL COMBINATIONS UNLESS THE CONTOUR OF THE PART IS SUCH THAT UNLIKE RADII ARE NECESSARY TO EFFECT A HEAT BALANCE
4. MINIMUM WELD SPACING IS THAT SPACING FOR TWO PIECES FOR WHICH NO SPECIAL PRECAUTIONS NEED BE TAKEN TO COMPENSATE FOR SHUNTED CURRENT EFFECT OF ADJACENT WELD
5. AVOID USING CONTACTING OVERLAPS BELOW THE VALUES SPECIFIED, OTHERWISE WELD STRENGTHS WILL BE DIFFICULT TO MAINTAIN UNDER SHOP CONDITIONS, OR DISTORTION OF THE LAPPING SHEETS MAY OCCUR

SETUP PROCEDURE:

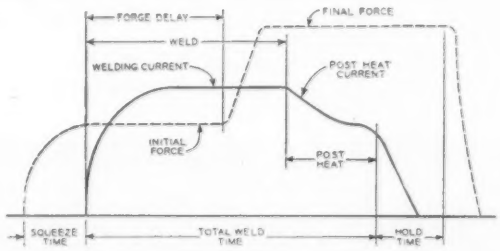
Check the force at the electrodes for magnitude and consistency.

Adjust the control to obtain the recommended approximate weld and postheat times. This is generally accomplished on single-pulse alternate polarity.

On thicknesses requiring forging, the current-force relationship must be adjusted by means of the forge-delay time to provide forging at the correct time.

To obtain the required current, start with a low value and make and test, single spot shear specimens, increasing the current until desired shear strength, weld diameter and penetration are obtained.

Check the machine for consistency of operation by making and testing 20 single spot shear specimens and 5 specimens for macroscopic examination. A variation of ±12½% in 90% of the specimens and ±25% in the balance is considered good.



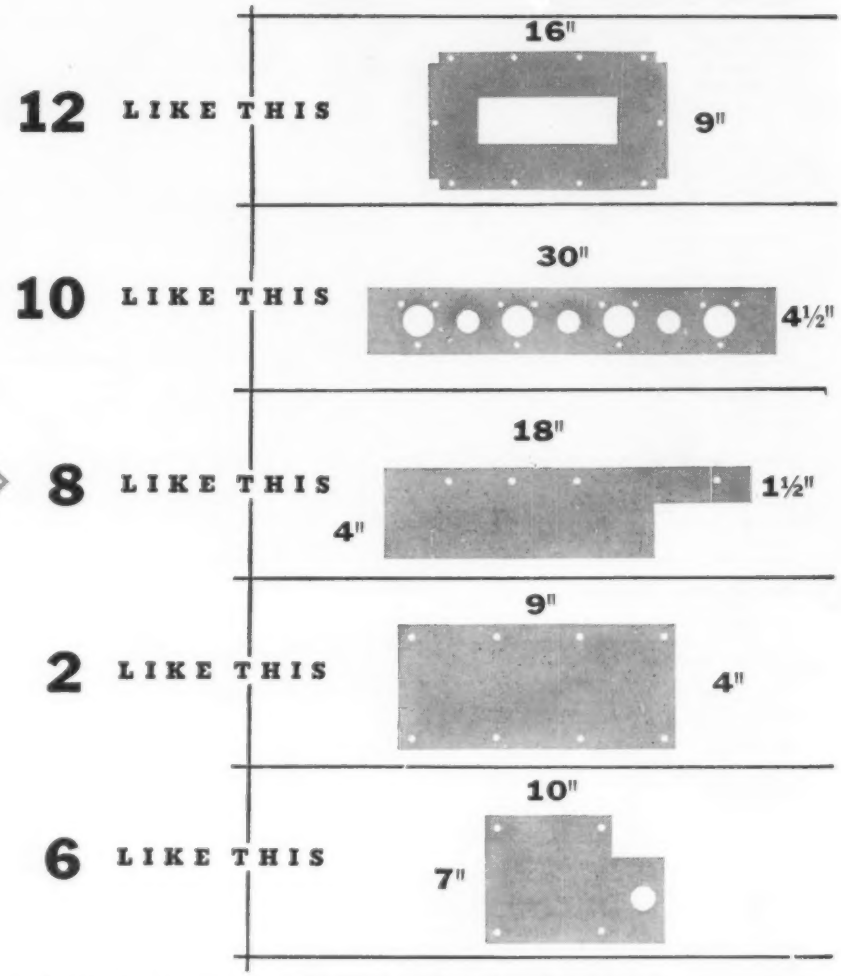
TYPICAL current-force diagram

with a WIEDEMANN you can

Reduce INVENTORY & STORAGE SPACE!

produce parts as required.

All
38
PIECES
were pierced in ⅛" mild steel
IN
28
MINUTES
(including all set-up)



The company producing the above parts has eliminated inventory of these and many other items; has greatly reduced inventory of punches and dies—and they no longer need to stock templates.

The Wiedemann method enables them to ship parts directly to assembly rather than the stockroom.

Items are produced weekly or more often if necessary. Sizes of parts pierced on the Wiedemann range from 5 ft. by 10 ft. down to 2" squares.

Inventory and storage reduction are just two of many cost-reducing features of Wiedemann Turret Punch Presses. We'll gladly make a time study on your own work.

WIEDEMANN MACHINE COMPANY

4272 Wissahickon Avenue, Philadelphia 32, Pa.

Spot Welding Aluminum...III

WELDING SCHEDULES FOR SINGLE-PHASE AC MACHINES

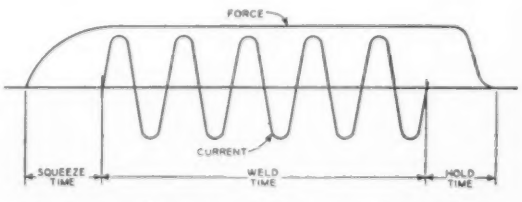
THICKNESS "T" (SEE NOTES 1 AND 2)	ELECTRODE DIAMETER AND SHAPE (TOP & BOTTOM) (SEE NOTE 3)		NET ELECTRODE FORCE	WELD TIME (APPROX.)	WELDING CURRENT (APPROX.)	MINIMUM CONTACTING OVERLAP (SEE NOTE 5 BELOW)	MINIMUM WELD SPACING (SEE NOTE 4 BELOW)	DIAMETER OF FUSED ZONE	MINIMUM AVERAGE SHEAR STRENGTH		
									19,500* TO 28,000 PSI ULT. TENS. STR.	28,000 TO 58,000 PSI ULT. TENS. STR.	58,000 PSI AND ABOVE ULT. TENS. STR.
IN.	D, IN.	R, IN.	LB.	CYCLES (60 PER SEC.)	AMPS.	IN.	IN.	IN. (APPROX.)	LB.	LB.	LB.
0.016	5/8	1"-F.	320	4	15,000	5/16	3/8	0.110	95	130	145
0.020	5/8	1"-F.	340	5	18,000	3/8	3/8	0.125	135	175	190
0.025	5/8	2"-F.	390	6	21,800	7/16	3/8	0.140	195	235	250
0.032	5/8	2"-F.	500	6	26,000	1/2	1/2	0.160	280	315	350
0.040	5/8	3"-F.	600	8	30,700	9/16	1/2	0.180	400	415	460
0.051	5/8	3"-F.	660	8	33,000	5/8	5/8	0.210	550	590	640
0.064	5/8	3"-F.	750	10	35,900	3/4	5/8	0.250	755	835	920
0.072	5/8	4-4	800	10	38,000	13/16	3/4	0.275	875	980	1130
0.081	7/8	4-4	860	10	41,800	7/8	3/4	0.300	1035	1155	1400
0.091	7/8	6-6	950	12	46,000	15/16	7/8	0.330	1175	1355	1700
0.102	7/8	6-6	1050	15	56,000	1	1	0.360	1270	1600	2050
0.125	7/8	6-6	1300	15	76,000	1 1/8	1 1/4	0.425	1400	2170	2830

*USE 75% OF THESE VALUES FOR BASE METAL TENSILE STRENGTHS OF LESS THAN 19,500 PSI

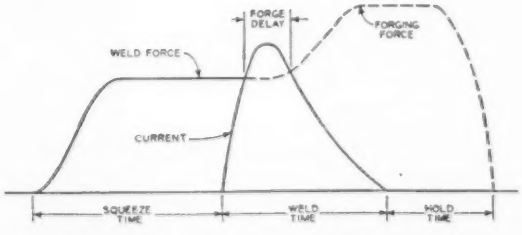
WELDING SCHEDULES FOR CONDENSER-DISCHARGE MACHINES

THICKNESS "T" (SEE NOTES 1 AND 2 BELOW)	ELECTRODE DIAMETER AND SHAPE (TOP & BOTTOM) (SEE NOTE 3 BELOW)		NET ELECTRODE FORCE		CAPACITY	CHARGING VOLTAGE	TRANSFORMER TURNS RATIO	TOTAL ENERGY	MINIMUM CONTACTING OVERLAP (SEE NOTE 5 BELOW)	MINIMUM WELD SPACING (SEE NOTE 4 BELOW)	DIAMETER OF FUSED ZONE	MINIMUM AVERAGE SHEAR STRENGTH (APPROX.)
IN.	D, IN.	R, IN.	WELD	FORGE	MFD.	KILOVOLTS		WATT SECONDS	IN.	IN.	IN. (APPROX.)	LB.
0.020	5/8	3	376	692	240	2.15	300:1	555	3/8	3/8	0.125	190
0.032	5/8	3	580	1300	240	2.7	300:1	875	1/2	1/2	0.160	350
0.040	5/8	3	680	1580	360	2.55	300:1	1172	9/16	1/2	0.180	460
0.051	5/8	3	890	2100	600	2.56	300:1	1952	5/8	5/8	0.210	640
0.064	5/8	3	1080	2680	720	2.7	300:1	2622	3/4	5/8	0.250	920
0.072	5/8	3	1230	3150	960	2.75	450:1	3630	13/16	3/4	0.275	1130
0.081	7/8	3	1550	4000	1440	2.7	450:1	5250	7/8	3/4	0.300	1400
0.091	7/8	3	1830	4660	1920	2.65	450:1	6750	15/16	7/8	0.330	1700
0.102	7/8	3	2025	5100	2520	2.7	450:1	9180	1	1	0.360	2050

Same notes apply as for schedules on page 125



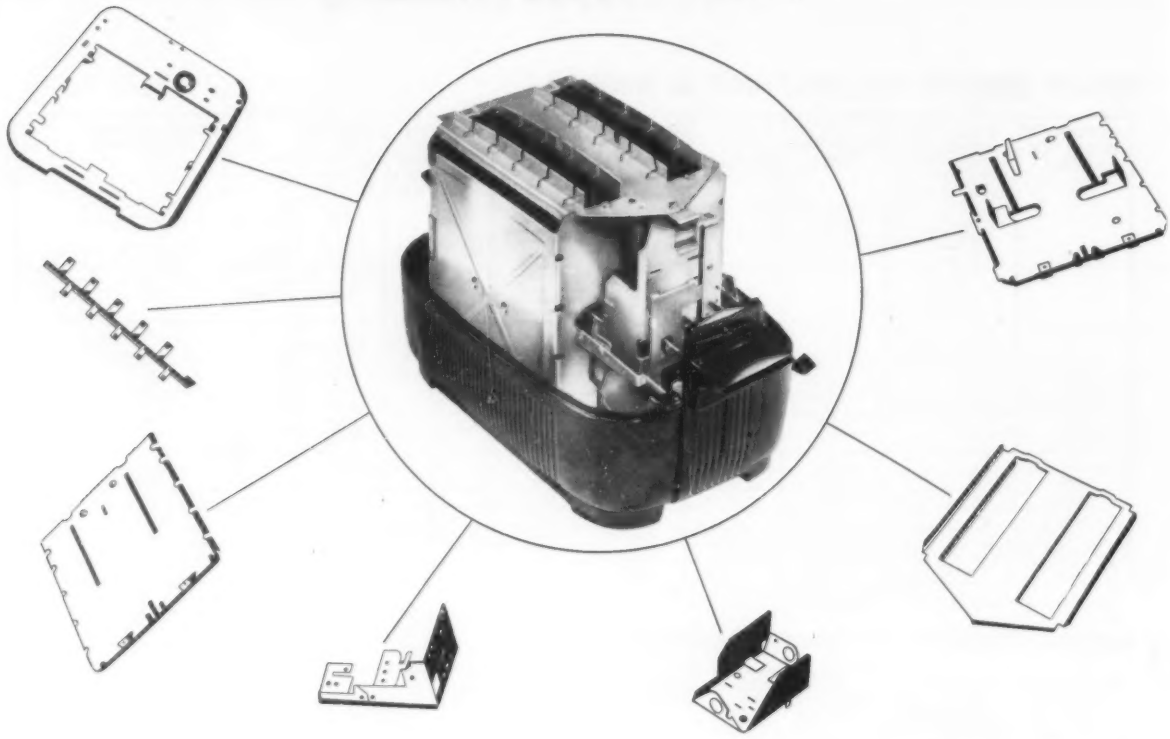
Current-force diagram for single-phase a-c type machines



Current-force diagram for condenser-discharge machines

Saves $100,000 a Year

by specifying this Special Armco Steel



A few years ago a leading manufacturer changed from a plated metal to Armco ALUMINIZED Steel for several parts of an electric toaster.

THE CHANGE-OVER SAVES $100,000 A YEAR. This saving is in plating costs alone. Because it is a hot-dip aluminum coated steel, Armco ALUMINIZED needs no plating. Interior parts of the toaster are simply stamped out and installed without any additional operations.

HIGHLY EFFICIENT, TOO

Besides cutting costs, parts made of Armco ALUMINIZED Steel assure top efficiency. The inside stays hot, the outside cool. The reason is that Armco ALUMINIZED is an excellent *heat reflector* up to about 900 F. It reflects more than 80 per cent of the radiant heat thrown against it.

At higher temperatures, Armco ALUMINIZED is a good *emitter* of radiant heat. From 900 F to about 1250 F the aluminum coating alloys permanently with the steel base. It forms a tight gray surfuce layer of iron-aluminum alloy. This also gives the steel an unusually good refractory coating.

If you make products that are exposed to a combination of heat and corrosion, there's a good chance that Armco ALUMINIZED Steel can help you cut costs and turn out a *better* product.

It may pay you to look into the advantages of this Armco Special-Purpose Steel. Just fill in and mail the coupon on this page for complete information.

ARMCO STEEL CORPORATION

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ARMCO

ARMCO STEEL CORPORATION
4963 Curtis Street, Middletown, Ohio

SEND ME INFORMATION . . .

I would like full information on Armco ALUMINIZED Steel sheets and coils. We manufacture

_____

NAME _____

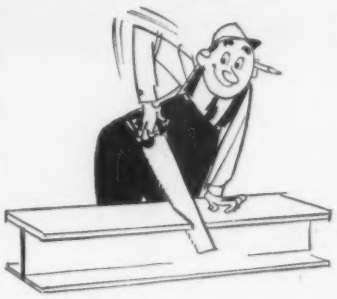
TITLE _____

COMPANY _____

STREET ADDRESS _____

CITY _____ ZONE ____ STATE ____

TALKING SHOP



Aluminum Surprise

ABOUT TWO YEARS AGO, Reynolds Metals was remodeling its office building in Louisville. Clarence Manning, vice president who heads sales development, was startled one morning, as he entered the building, to see a carpenter cutting aluminum molding with a regular crosscut saw. When Manning objected to this mistreatment of a good saw and pointed to a hacksaw nearby, the carpenter said, "I've been cutting aluminum with this saw for months and I can't find any damage. Maybe you can." Manning couldn't.

That's how the "Do It Yourself Aluminum" was born. Manning set up a complete workshop of conventional hand- and power-woodworking tools complete with a bewildered cabinetmaker who was told to use the shop to work aluminum. Turned out that the softer alloys dulled tools no more than wood. Result was a pamphlet on home working of aluminum and distribution through hardware and building-supply outlets of Reynolds sheet, rod, bar, tubing, extrusions, and fasteners. But don't try it on heat-treated structural alloys. They're still as hard as they ever were.

Less Dressing

UTICA (NY) DROP FORGE & TOOL CORP has been grinding precision-forged jet blades of Nimonic 80 stainless. Two form grinders, on pilot runs, required 8 sets of diamonds per shift, costing $496, also had fume problems. Wheels loaded to spoil and burn parts. The final installation of ten form grinders includes three Hoffman pressure filters with a flow rate of 140 gpm, on a 3-compartment settling tank with sludge-removal conveyor. Wheel dressings were cut 95½%, diamond cost to $62 a shift for *six* machines, and lowered oil temperature eliminated fumes.

"Sound" Idea

AT MINNEAPOLIS-HONEYWELL, an industrial stethoscope has reduced scrap loss and operator fatigue in burnishing operations. Ted Minor, a methods engineer in the aeronautical division, noted that operators were leaning over the machines to listen to the noise of the burnishing wheels. The sound of the wheel varied with the amount of metal being removed by the wheels. With a microphone, amplifier, and earphones, the operator sits at the machine and, judging by the sound, can hold extremely close tolerances. An electronic comparator to check dimensions before and after burnishing is provided, accurate to 0.000005 in. This "sound" control has reduced scrap loss from overshooting and eliminated the need for operators to spend the day bent low over the burnishing wheels. It is nice to know, in an age when talk about "automatic factories" is popular, that there is still a place for skilled human perception, even when aided by microphone and amplifier.

Two Bits

A DOUBLE-SPINDLE GRINDER with a jig that handles two carbide jackbits instead of one almost doubles grinding speed for these coal-mining tools. The idea was advanced by a 26-year-old grinder at Carboloy named James H Braun. He got an award for $480, highest in 16 years.

What Have We On——?

A STARTLINGLY DIFFERENT method of indexing has been developed by the Armed Services Technical Information Agency (ASTIA) and is now in the field-test stage. With the forbidding name of Uniterm Coordinate Indexing, it is expected to save libraries and technical-information centers up to 90% in catalog space and 75% in cataloging time.

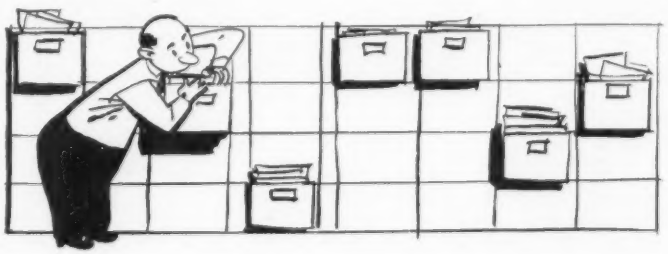
Suppose a report is received on *aircooled aircraft guns*. With present methods, such a subject could be indexed in six different ways, posing a problem first for the indexer and later for the person trying to find the report. In practice it would probably be listed under two or three different headings.

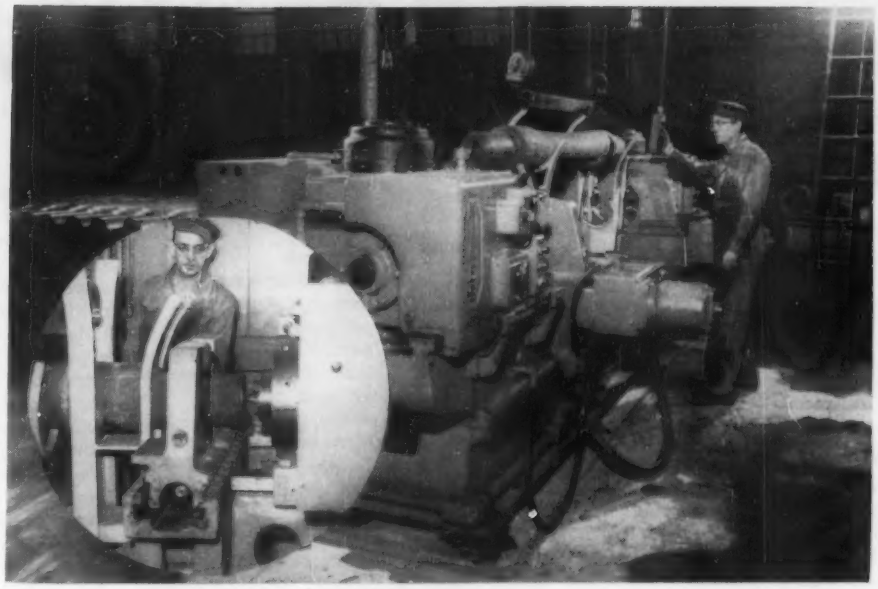
In the new method, the report is filed under a simple acquisition number and this number entered on cards headed *aircooled*, *aircraft*, and *guns*, eliminating the selection problem for the indexer. To locate this report, and all others dealing with this subject, the three cards would be withdrawn from the file and checked for any numbers listed on all three. Cards have ten columns and numbers are entered in the column determined by the last digit to simplify this comparison. In a small library the comparison would be made by looking at the cards, in a large library it could be done by machine methods.

After you consider this idea for awhile, if you've had as much trouble with indexes as we have, the basic simplicity of it makes it look a lot more attractive than it did at first. You'll likely be running into Uniterm Coordinate Indexing one of these days, by which time, we hope, it will have a simpler name.

Overseas Roof

GLEASON WORKS has modified boxing for overseas shipment, replacing the usual tar-paper topping with galvanized iron sheet tacked on. Joints and nailheads are coated with waterproofing. This avoids frequent puncture of the former cover material and consequent damage from water.



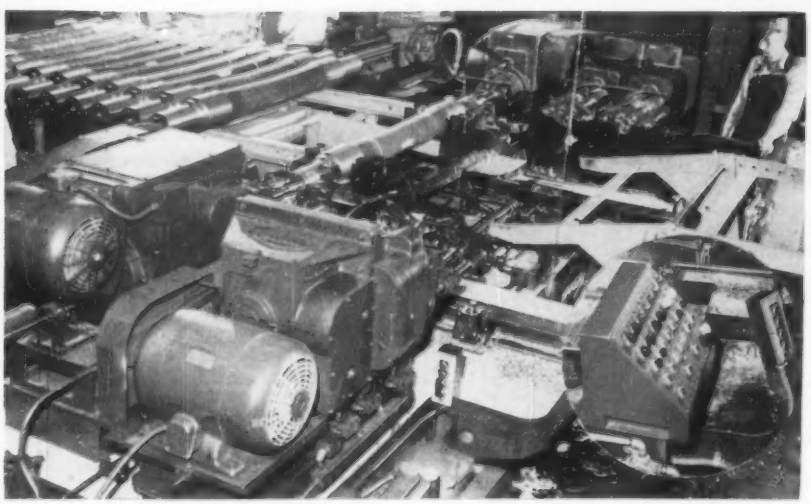


RECENTERING of rough axle forgings comes first. The 1100-lb axle is lifted from a rack by twin electric hoists with a spacer bar carrying two hooks (right). It is dropped into a cradle-locator (inset) built into a double-end Niles recentering machine, gripped by four-jaw screw chucks, and center cutters move in from each end. All operations are automatic after handling

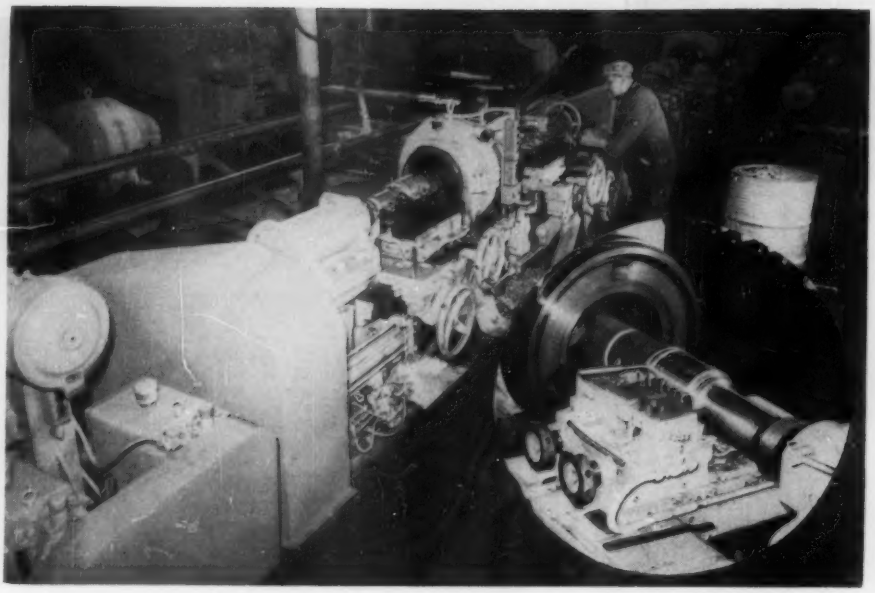
Railroad axles roller-bearinged

Automation principles are applied in machining axles and assembling bearing housings and trucks at Huntington, W Va, plant of American Car & Foundry Co. Here, in pictures, are unusual elements of the line, producing 80 axles a shift for a current 600-car ACL hopper-car order

By E J TANGERMAN
EXECUTIVE EDITOR

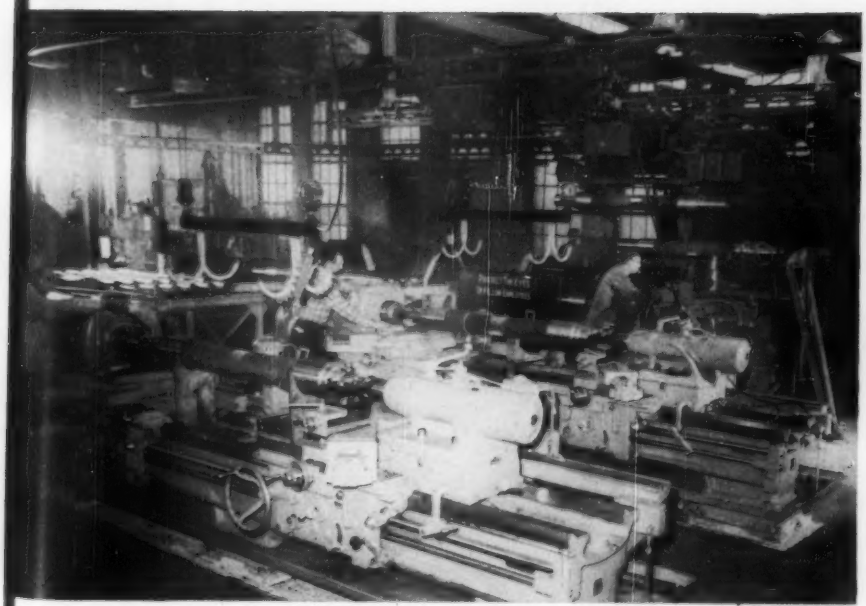


AXLES ROLL BY GRAVITY down to a Baker Bros automatic 2-way unit, where both ends are countersunk, drilled, and tapped simultaneously. An air lift puts the axle in place, where it is gripped by an air chuck. Operation is automatic for all six heads (inset). Complete cycle time is about 4 minutes, and finished parts are ejected to roll on down to finishing lathes

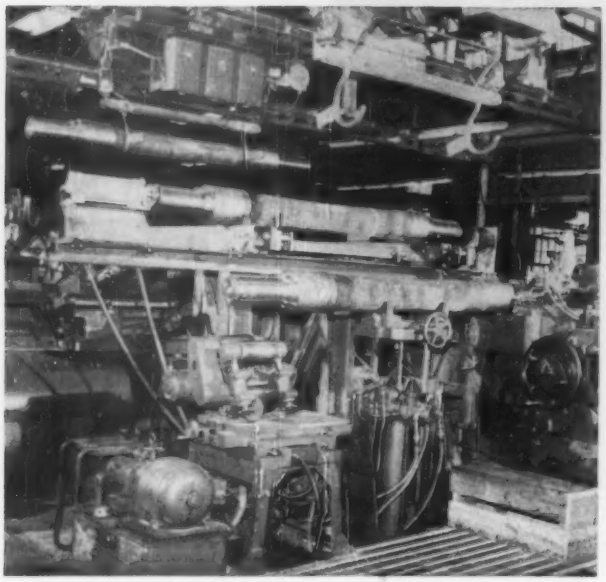


ENDS ARE ROUGHED in two multi-carbide tooled Betts center-drive axle lathes which produce wheel-seat, journal, and shoulder surfaces simultaneously. Two similar lathes (insert) finish-machine wheel-seat surfaces to close tolerances

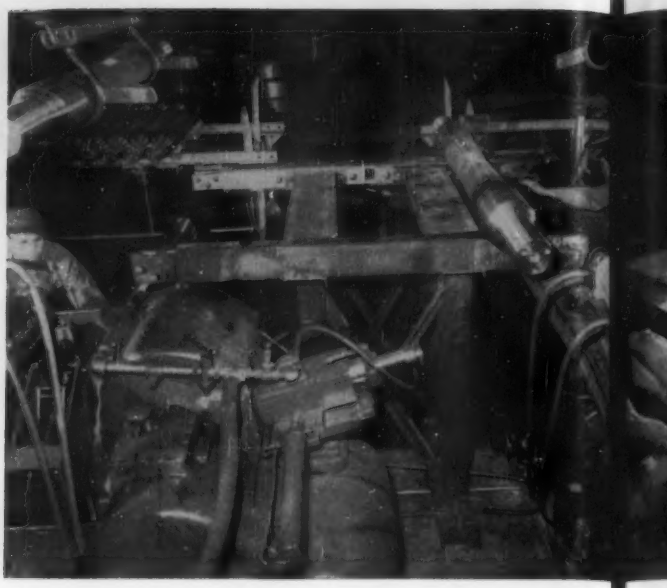
at freight-car production speeds



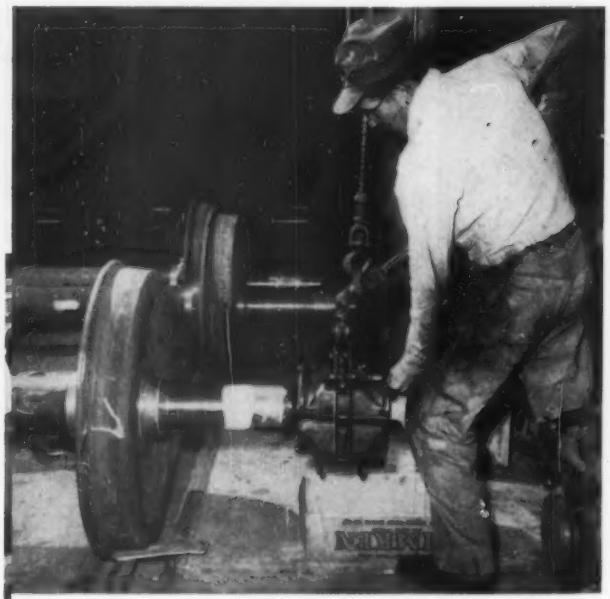
JOURNALS AND DUST GUARDS are finish-turned dry in one of two Monarch dual-carriage lathes equipped with air tracer at 237 rpm and 0.020-ipr feed with carbide tools. A stud screwed into one end hole of the axle is engaged by a lug outside the live center to drive the axle. Each machine can produce 60 axles in 8 hr. Axles are brought from transfer rails by twin hoists on a Tramrail. Double hooks permit finished axle to be lifted out and new part inserted at the same time. Note V-cradle built between ways to receive work (one V in closeup at right)



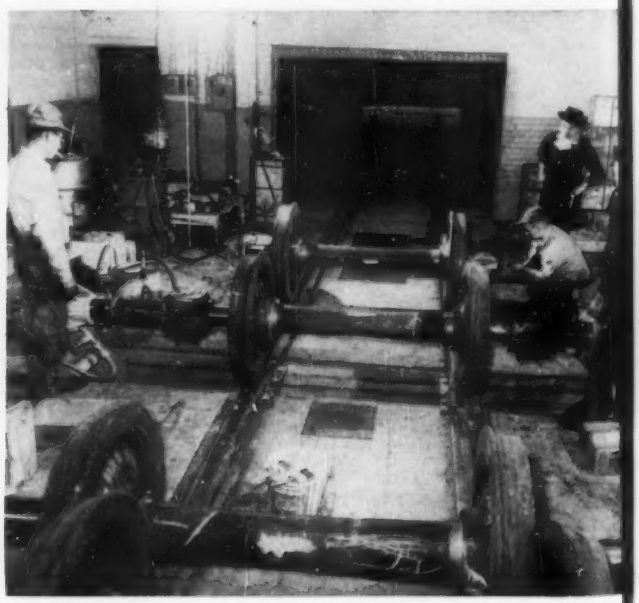
CENTERLESS GRINDERS have been adapted for the first time to an 1100-lb job in this dual setup for form-finishing journal dust collar and fillets within 0.001 in. Shafts are brought in by automatic Tramrail and set into the V's of a hydraulic lift. This lowers the axle into the Cincinnati centerless for the wheel to infeed and plunge grind. An Arnold gage (first time on a centerless) indicates by green, amber, and red (within 0.001 in.) lights (far right) when size is being reached. Machine is usually held to the upper 0.0005-in. bracket, could be operated to 0.0002 in. Output is 90 ends in 8 hr per machine, much faster than by conventional methods



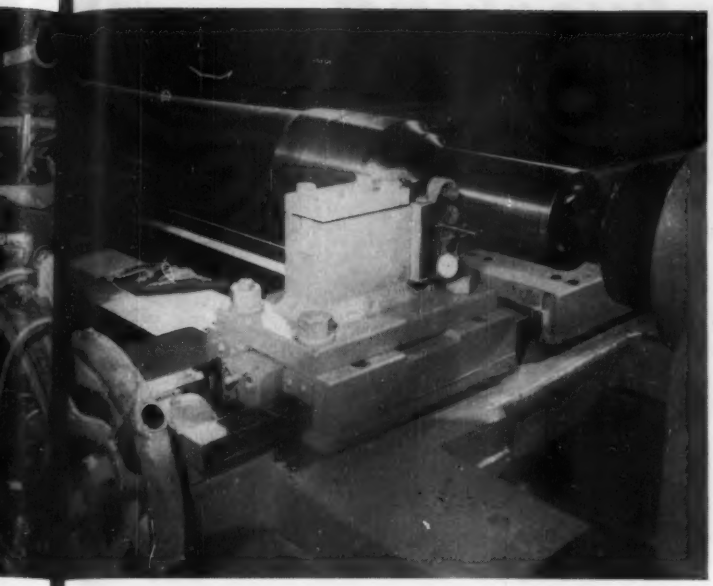
ONE GRINDER FINISHES each journal; between them are transfer rails with a slight slope. When one end is finished at left, the hydraulic lift elevates it and the operator extends the arms at the end of the transfer unit, then lowers the lift. When he pushes the extensions back, the axle rolls to the other grinder. It is positioned against the locating plate in the background by the air cylinder at right, then rolls on into the sockets on arms which can be extended over the hydraulic lift on the other machine



INSPECTED BOXES, with a wooden filler to hold parts in place, is slipped over a starting sleeve on the end of the axle and started on the axle itself, all by means of an overhead hoist with special clamp and lever for minor changes in height

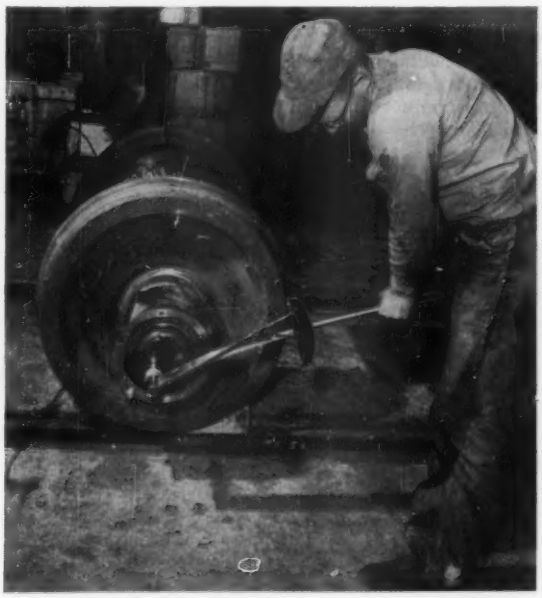


BOXES ARE PRESSED on tight up to the shoulder by twin air presses, the rams of which press on a collar supported by a pantograph arm on the press frame. Note the double tracks so axles can be nested as in foreground to save space. Finished axle assemblies are carried on for final operations and through the door into the truck shop

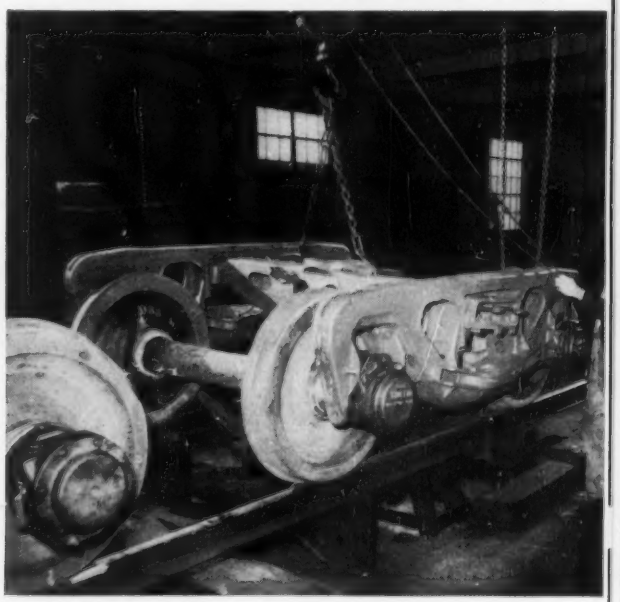


TRADITIONAL JOURNAL COLD-ROLLING is done on a Betts burnisher with a ball roll for each journal. The unusual element is a dial indicator which shows pounds of pressure on the ball. It indicates deflection of the spring which forces the ball against the work. After burnishing, done to prestress the metal rather than to achieve a surface, the axle is inspected by the customer before wheels are mounted

ROLLER-BEARING JOURNAL BOXES are assembled on their own line. Housing castings are cleaned in a tank, then rolled along the conveyor to three presses in turn, the first pressing in both outer races, the second checking lateral motion, the third applying seals. Here, the lower race is placed on an air plunger, the housing positioned over it, the upper race and a spacing collar inserted, and pressure applied to equal that in service. The journal box can now be rotated and lateral motion read on the dial gage on the plunger



END CAPS on journal boxes are held by three wired cap bolts. To assure proper tension a hand torque wrench is used, set for 200 in.-lb. Bolts are then wired, with special care to avoid wire ends getting into the bearing, greasing and bleeder fittings applied, a neoprene gasket put on and the dust cover installed with capscrews pulled up by air impact wrench. Grease (4½ lb) is put in by air pressure and the axle is ready for final inspection



FINISHED AXLES are lifted and rotated 90° with an air hoist and rolled along elevated tracks for application of truck side frames. Here are the axles and truck bolster in place, ready for insertion of seven coil springs on each end. Brake rigging is installed here also. The completed truck rolls off at right, ready for the erection shop (See AM—July 29, '48, p116)

News of Metalworking

Continued Good Business in 1954 Is Basis For Legislative Proposals Now Before Congress

WASHINGTON—Top administration officials and Republican leaders in Congress are agreed on one thing: that the business outlook for the coming year is good. At most, they expect only slight adjustments in some lines—but no snowballing of these into a general business downturn.

This business outlook was a major factor behind most of the legislative proposals that Eisenhower and his team discussed during the three-day White House Conference—and it is behind the messages President Eisenhower is now presenting to Congress.

Much of the Eisenhower program can be called a prop to the economy, including the Metalworking industry. But other proposals may have a generally depressing effect on the hard goods business.

Here's the outlook as of January 1:

• **Military spending**—the Pentagon is under more pressure to cut down spending and help produce a more nearly balanced budget for the year beginning next July and ending June 30, 1954.

One thing to note: there's no special machine-tool legislation coming up—the Vance Plan was adopted last year. Big question during the Congressional appropriation hearings in the next few months will be: how much money, if any, will be put into the military budget for expansion of production capacity?

• **Foreign Aid** — appropriations for this fiscal year amounted to about $4.5 billion—with most of the spending going for arms shipment via the military's regular procurement channels. This year's appropriation will be cut sharply.

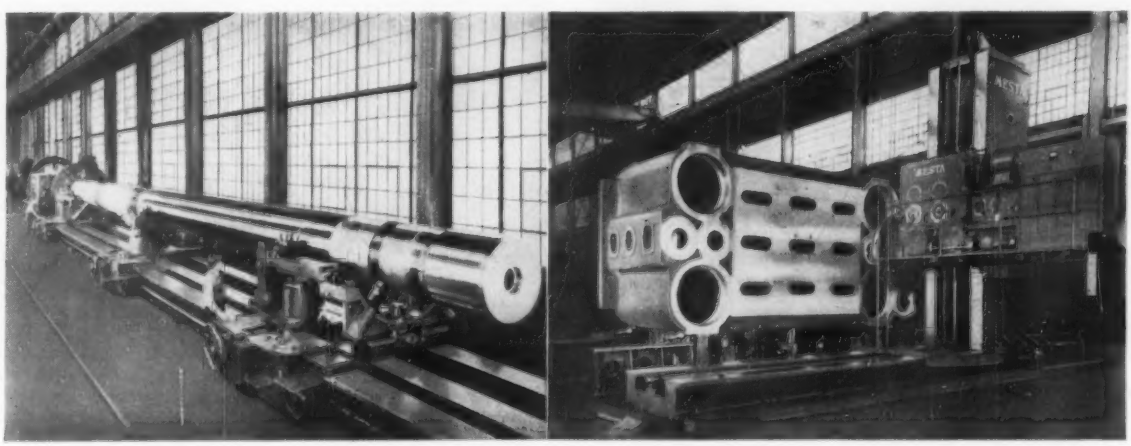
• **Housing**—the Federal Government has been a big prop under housing construction ever since the end of the war. And the Eisenhower proposals are designed to produce 1 million new starts this year — the same as in 1953. There are some shifts involved in financing in order to get more private enterprise and less government in the program.

• **Credit and hard money**—after having tightened up on credit supply in order to "stabilize the dollar" early last year, it is definitely settled administration policy to do nothing from here on out—at least until Election Day—that would tighten credit any further. The Federal Reserve Board and Eisenhower's own economic advisors want to do whatever they can to make sure that no businessman with a legitimate need for credit goes without the money.

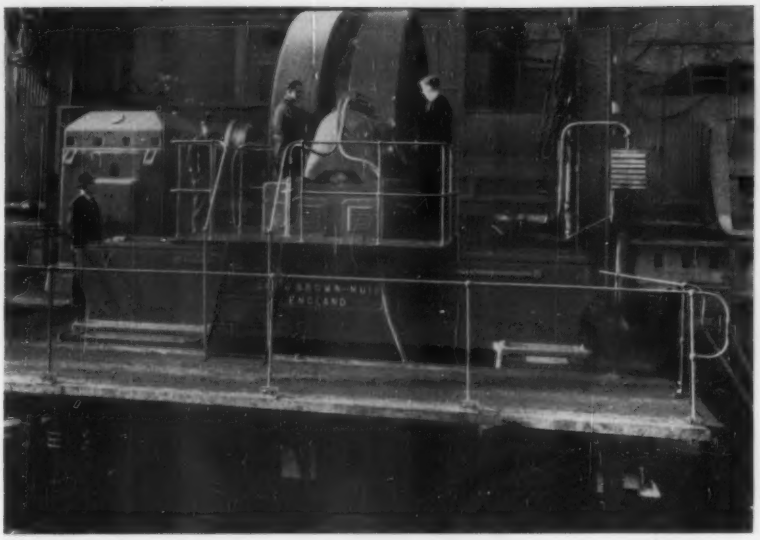
• **Taxes**—outlook here is fuzzy. The 10% reduction on income taxes paid by individuals went into effect January 1; so did the repeal of the Excess Profits Tax. Eisenhower asks that any further tax reductions be offset by new taxes elsewhere to the extent necessary to keep revenue up. But Congress may go its own way on this. The corporate income tax rate is due to drop from 52% to 47% April 1. The temptation is to let it go, or perhaps "split the difference" with the President, putting the new rate at 49 or 50%. The same goes for excise tax cuts.

• **Reciprocal trade** — protectionist sentiment keeps growing as more and more industries complain about competition from foreign imports. Chances are good that the "trade not aid" bloc will feel lucky if it pushes through a Reciprocal Trade Law without more protectionist features tacked onto it.

• **Labor**—Taft-Hartley Law amendments are the hottest issue on the labor front, but chances are good that this will be settled by the simple technique of passing no legislation at all—or relatively minor and noncontroversial amendments. Most play will be given to extension of the Wage-Hour Law to workers not now covered (some 27 million of them) and raising the minimum wage from the present 75 cents an hour. The administration will also pressure for increased Unemployment Insurance benefits—but the States control this.



GIANT COMPONENTS for a 50,000-ton hydraulic die forging press being built at Mesta Machine Co, Pittsburgh, include (left) one of eight 76-ft-long columns, each made from 500,000-lb ingots, shown being machined on a 96-in. turning and boring lathe. Before finishing, 10-in. dia holes were bored through by trepanning from both ends; and (right) machining one of two 475,000 lb cast steel lower base sections for the largest press ever built



GEAR SHAVING IN BRITAIN, at John Brown & Co, Ltd, Clydebank shipbuilding firm, is done on this 130-ton machine that can accommodate 220-in., 100-ton marine turbine wheels. Machine's cutter head is equipped with a brake on each side to permit selection shaving. Machine, built by David Brown Machine Tools, Ltd, Manchester, is fitted with pinion mounting bracket at rear, allowing it to be used as a testing bed to determine tooth marking without removing the turbine wheel from the shaving machine

FIRTH STERLING FORMS BRAZILIAN COMPANY

SAO PAULO, BRAZIL—Firth Sterling, Inc, of Pittsburgh, has entered into an agreement with Brazilian Industrialist Ary Torres to form a Sao Paulo counterpart of Firth Sterling. The new company will import such F-S products into Brazil as high-speed tool steels and tungsten carbide cutting tools, neither of which are available from local sources. Firth-Sterling purchases substantial quantities of such raw materials as tungsten ore concentrates from Brazil.

SWISS MACHINE TOOL OUTPUT DECLINES

ZURICH—Sharpest decline in new orders reported by the Swiss hard goods manufacturing industries is in machine tools. Average order backlogs for Swiss metalworking industries for the third quarter were 6.4 months, contrasted with the second quarter's 6.6 months, and the first quarter's 7 months.

Military Will Have Tough Time Paring Costs To Meet Accelerated Fiscal 1955 Budget Cuts

WASHINGTON — President Eisenhower and his military men are cutting faster on defense spending than they previously planned to do. The Defense Dept now figures military spending in fiscal 1955 at about $38 billions. This is $5 billion less than the anticipated spending program of about $43 billion for the year ending June 30, 1954.

All Services Affected

The new cutback in military spending—okayed by Eisenhower at a White House meeting with top officials from the Pentagon and the National Security Council — will come from all parts of the military's program: procurement of hard and soft goods, construction, maintenance, operations, manpower.

Eisenhower may have trouble with other parts of his program, but the military budget is one field on which he can speak authoritatively. He could point out to Congress that the areas he and Secretary of Defense Wilson are slicing into may be the ones offering the least danger in whittling the military budget.

Procurement and production will also be cut, but not sharply. Aircraft expenditures, peaking in 1954, will gradually drop off to a maintenance level of around $7-8 billion by 1957. In the meantime, guided missile procurement, now about $1.5 billion, will gradually climb along with electronics. Ammunition, tanks, motor vehicles and ship construction will materially drop between now and 1957.

One big area of spending reduction will be in construction. Right now the military has about $4 billion in construction funds on the books. But contract letting—new obligations—since the first of the fiscal year has been running on an average of only about $100 million a month.

A cut of up to half-a-million men in uniform between now and mid-1955 is going to allow a big cut in pay and allowances, but perhaps an even bigger one in maintenance and operations. For one thing, the military will have to buy less uniforms, blankets, towels, fuel, food, equipment, etc. And, having been buying to meet the needs of 3.5 million men, the military can now coast along for a year or more until the reduced manpower eats up the surplus. And the Pentagon has passed along the order that the services must dig into mobilization stockpiles, rather than come up for new money a year or so from now.

There's more to the military budget slicing than just corner cutting. Admiral Radford's plan for doing over the services so that they are built around aviation means a big cut in operating and procurement costs of the Army and Navy.

Even so, the $5 billion reduction of military expenditures to $38 billion next year went over well with the legislators, giving them a solid plank to campaign on. GOP campaigners can now show their constituents how the Republicans have been able to cut military spending more than $8 billion in two years.

But the military will have its troubles meeting the program. The Pentagon is already in hot water trying to get down to the $41.7 billion the GOP revisions allowed for this fiscal year. With half of 1954 over, military spending is running about $300 million in excess of the corresponding fiscal 1953 period. Spending will come down some in the next few months, but the betting is that the military will go $1.3 billion over the budget for 1954. Reasons: stepped up aircraft production, no substantial reductions in Korean costs.

E W BLISS TO OPEN WEST COAST PLANT

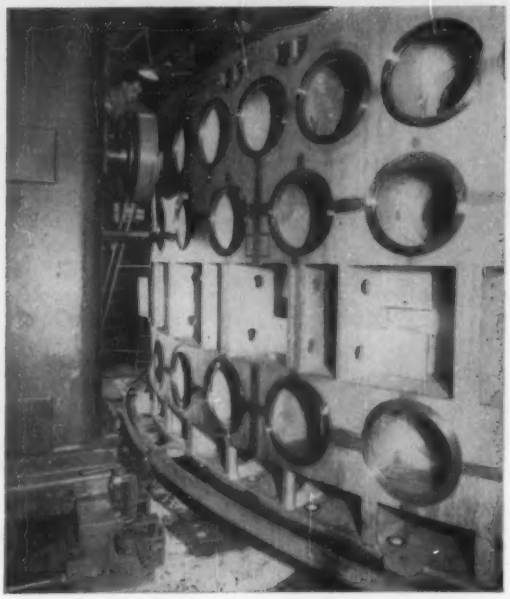
SAN JOSE, Calif—E W Bliss Co, Canton, Ohio, manufacturer of metalworking presses and equipment, has leased a 62,500-sq-ft plant here for the manufacture and repair of all Bliss products except for its largest metalworking presses and rolling mills.

The San Jose plant, according to Bliss President Howard U Herrick, will in addition to the manufacture of Bliss products, warehouse a complete stock of standard Bliss press parts and will maintain facilities to service the presses. Stocks of standard die sets and supplies made by Bliss's subsidiary, Die Supply Co of Cleveland, will be kept on hand and special die makers' supplies will be manufactured at the plant.

KURT ORBAN FORMS CANADIAN AFFILIATE

TORONTO—Kurt Orban Co, Inc, of New York has formed a Canadian affiliate here, Kurt Orban Canada, Ltd, to distribute machine tools, metals and mill products imported from Germany. Gunther Kneidel has been appointed commercial manager of the Canadian affiliate, located at 2490 Eglington Ave, West, Toronto.

BULLARD QUARTER-CENTURY CLUB had its inauguration meeting at a dinner held December 8 in Bridgeport, Conn. Here Company President E C Bullard (center) awards a gold watch to Harry Long, one of the club's 219 charter members, all of whom received watches. Background are: (left) Personnel Director J C Olson, and 25-year-veteran Leopold Sablofski



MOUNTAIN TO MOHAMMED technique is employed at Westinghouse to bore steel ring for a wind tunnel. After each 3-deck tier is bored, hydraulic jacks ease the ring up to the next position. Six-ft-long stationary blades will go into bored sockets inside the ring

Japan Tooling Up for Industrial Expansion, Bullard Executive Reports

BRIDGEPORT, Conn—Japanese industrialists plan to tool up for a large expansion in production in the next two years, Frank U Hayes, vice president and sales manager of the Bullard Co, said upon his return from a two-months' trip to Japan. The automotive and electrical goods industries and possibly the shipbuilding industry will be in the middle of these plans.

Huge Machine Tool Market

Bullard expects to export more machines to Japan than to all of western Europe in the next few years, Mr Hayes declared. A substantial percentage of machine tools now installed in Japanese plants is very old and inefficient and will have to be replaced if the anticipated production goals are to be reached.

US to Finance Expansion

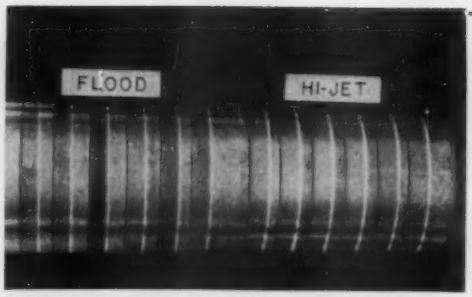
The Japanese are poor as a result of the war and its aftermath, but money for industrial expansion will come from American sources—offshore procurement, Mutual Security Agency and spending of occupational forces in Japan—and from a gradual increase in export trade. Mr Haynes warned that gains will be slow because of the poverty of the country's economy. Many production problems center around importation of materials.

Interest in new machine tools in Japan is keen, he observed. More than 3000 Japanese executives and engineers attended the Machine Tool Show staged in November by Cosa Corp. US machine tools were on display at this show.

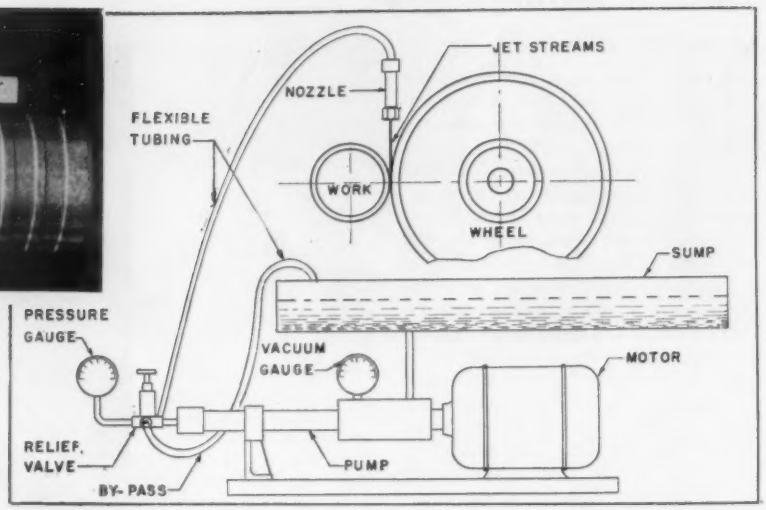
Austin cars are being made in Japan now under an agreement whereby all the parts will be produced in Japan with the next five years. That alone represents a sizable tooling program. Another prospective tooling program involves manufacture of an American jet fighter plane. On top of that, a program for production of Willys jeeps is under way.

Workers Average $40 Month

Japanese industry is highly competitive, Mr Hayes said. Most companies are working a 40-hour week and the average employee gets about $40 a month. The largest industrial section is centered in the Tokyo-Yokohama, Osaka-Kobe and Nagoya areas. These combined areas have a population of about 16 million. Mr Hayes visited 20 metalworking plants in those areas.



COMPARATIVE RESULTS of grinding with jet and flood methods on SAE 4142 steel, R_c41 with 60-grit, "Q" grade wheel at 0.010 ips plunge rate



SCHEMATIC of jet application of cutting fluids to plunge grinding

Jet Cooling Triples Feed Rate on Plunge and Thread Grinding of Tool Steel R_c 62-64

CLEVELAND, OHIO — Thompson Products, Inc, has announced completion of successful field tests of high-pressure solid-jet application of cutting fluids, using the Hi-Jet system in plunge grinding and thread grinding of mild and hard steels.

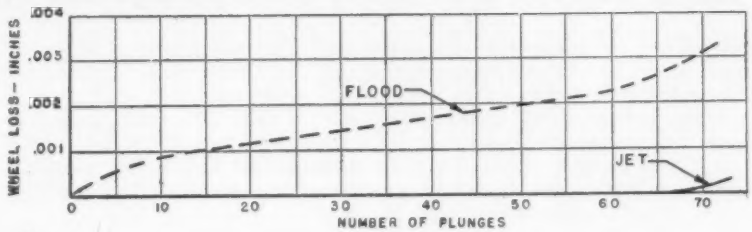
Early lab tests of jet cooling indicated considerable merit in the system, as applied to thread grinding, showing less root breakdown on both hardened and mild steels, than with conventional flood cooling.

Infeed Increased to 0.060 In.

The first field test on a production basis was made by a Cleveland thread-gage manufacturer grinding thread gages of hardened HSS and tool steel, hardness, R_c 62-64. With conventional cooling, normal infeed per pass was 0.020 to 0.025 in. With jet application, infeed could be increased to 0.060 in. per pass without burning, and with sizes still within tolerance. This reduced the number of passes to complete a cut from 6 or 7, to 4 passes. With clean oil, finish was also improved. Tests were also run on thread grinding case-hardened AISI 1118C (hardness R_c 56-63) and such materials as Maxel (hardness R_c 30-35), and in all cases substantial increases in production rate were reported for the jet system.

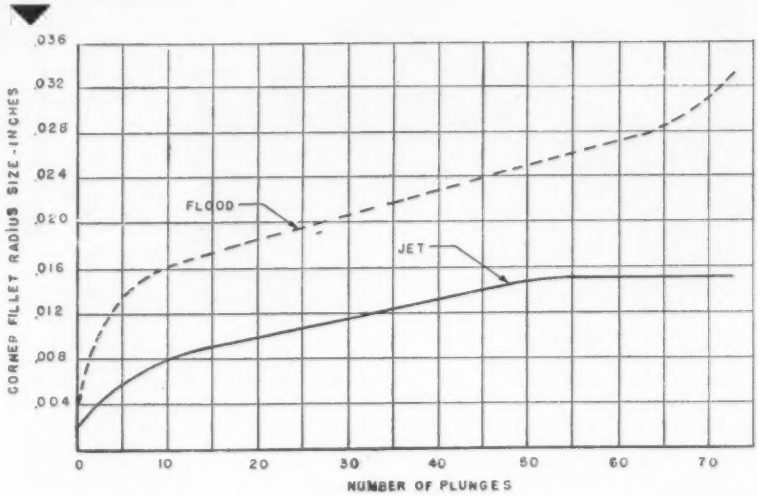
Thread Grinding Stainless Steel

Further field tests were run by Thompson, thread grinding stainless and 4140 tubing, R_c 30-38. This hard-



COMPARATIVE WHEEL LOSS AND NUMBER OF PLUNGES for jet and conventional flood grinding. Machine: Landis 31. Wheel: 14 x 2 x 5-in. A120-K5-V10 with 0.250-in. face and 1750 rpm speed. Material: SAE 4142, R_c41. Work speed: 90 sfm. Plunge depth: 0.100-in. Plunge rate: 0.002 ips. Fluid: Gulf 240 *(Courtesy Carborundum Co)*

COMPARATIVE LOSS OF FILLET RADIUS AND NUMBER OF PLUNGES for jet and flood
(Courtesy Carborundum Co)



News of Metalworking

Jet Cooling (continued)

ness range often represents a burring and wheel loss problem. Again the reports of significant improvement with jet cooling.

Lab tests by Carborundum checked two types of plunge grinding—repeated slow plunges to check extent of wheel breakdown (see charts), and increasing rates of infeed, to compare the abilities of jet and conventional cooling. In the second series, run with a 60Q wheel, infeed rates of 0.002, 0.005, 0.010, 0.015, and 0.020 in. per second showed no burn or discoloration with jet application. With standard cooling, discoloration appeared at 0.005 ips, severe burn at 0.010 ips, and the face of the grinding wheel was crushed at 0.015 ips. The 0.020 rate was not tried, for safety reasons.

DOUBLE-END TREPANNING lathe at Spang-Chalfont's Ambridge plant bores drill collars up to 55-ft-long from both ends at once. Collars are center-driven, and non-rotating trepanning heads move in from each end. Lathe is 146-ft. 6½-in. long. Cores are used for production items requiring small-diameter bar stock

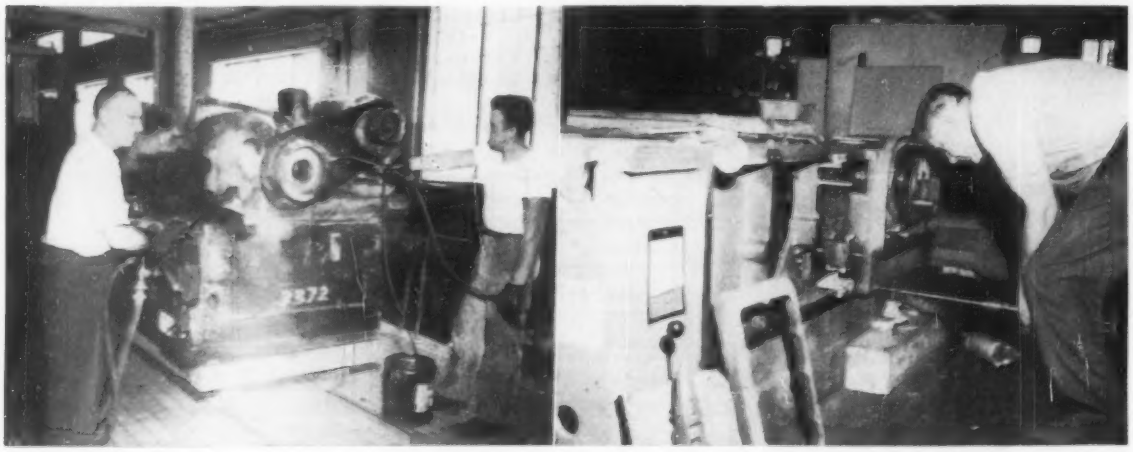
Auto Industry Employment, Payrolls Hit All-Time Peak

DETROIT — Automotive industry maintained an average employment of 930,000 in 1953 and paid its workers $3.5 billions—both all-time records. Included in the total employed are 770,000 production workers, who averaged 40.8 hours of work per week at an average hourly rate of $2.14. Weekly paychecks averaged $87.38.

Automobile output in 1953 was second highest in the industry's history, with production of an estimated 7.37 million motor vehicles: top auto year was 1950, with over 8 million units. The year's output increased 33% over 1952's, and includes an estimated 6.16 million passenger cars and upwards of 1.2 million trucks and buses.

Defense production, according to the Automobile Manufacturers Association, accounted for nearly 20% of the auto industry's 1953 business. And defense output is expected to stay at or near that level through 1954 in spite of cutbacks and stretchouts.

What's the future? Here's what AMA Managing Director W J Cronin has to say: "With 12 months of high-volume production behind it, the automotive industry is looking forward confidently to another outstanding year . . . a strong and steady market for vehicles."

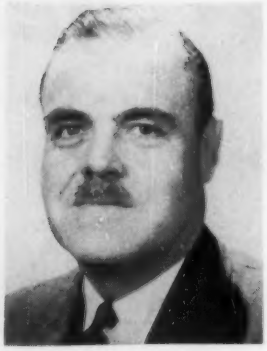


RECONDITIONING GRINDERS badly burned in the General Motors Livonia transmission plant fire was a double challenge to the Norton Co, which itself was just recovering from $1 million damage suffered from a tornado early last summer. When the tornado struck Norton, offers of help poured in from the metalworking industry. So it was only natural that when GM's stricken Livonia plant set out an urgent SOS in the form of 38 Norton grinders to be reconditioned as quickly as possible, Norton employees pitched in to repay the debt by rebuilding them almost six days ahead of the schedule set down by GM. Starting with charred wiring, twisted metal and rusted surfaces covered with soot, burned paint and tar, workers steam cleaned the units (left), inspected them, shotblasted them, replaced unsalvageable parts, replaced electrical controls, etc, and had the rebuilt grinders (right) back in jig time

Walter F Rockwell

F G McCloskey

F P Maxwell



Paul B Wishart

Names in the News

Walter F Rockwell has been elected chairman of the board of Acro Manufacturing Co, Columbus, Ohio. He served as president of the Timken-Detroit Axle Co for the past 33 years, and retired Sept 30 when the firm merged with Standard Steel Spring Co of Coraopolis, Pa, to form Rockwell Spring & Axle Co. **F G McCloskey,** executive vice president and a director of Acro, has been named president.

J P Gill has been named president of Vanadium-Alloys Steel Co, Latrobe, Pa. He joined the company in 1920, was elected vice president in 1943, and in 1945 was made chairman of the executive committee of the organization and its subsidiaries. He is president of the company's Colonial Steel Div and was recently named head of Vanadium-Alloys Steel Canada, Ltd.

F P Maxwell has resigned as president of Acro Manufacturing Co, Columbus, Ohio, to accept the newly-created position of vice president of Rockwell Manufacturing Co's Power Tool Div, Pittsburgh. Mr. Maxwell, who headed the Ohio firm for seven years, was associated with Rockwell in 1946-47 as assistant to the vice president, sales.

R B Crean has been named vice president of the Ingersoll Products Div, Borg-Warner Corp, Chicago; he will retain his title of assistant general divisional manager. Mr Crean resigned as vice president of Baldwin-Lima-Hamilton Corp's Eddystone Div last spring to join Ingersoll Products. **Howard A Schmeal** has been named secretary and treasurer, and **Robert F Schultz,** assistant treasurer, is now, in addition, assistant secretary.

Paul B Wishart has been elected president of Minneapolis-Honeywell Regulator Co; he takes over the post held by **Harold W Sweatt,** made chairman of the board to succeed **Mark C Honeywell,** named honorary chairman. **Tom McDonald,** vice president, sales, and **A M Wilson,** vice president, Aeronautical Div, have been elected directors. Mr Wishart, who joined the organization in 1942, was made vice president and general manager in 1952.

L G Jones has been named manufacturing manager of E W Bliss Co's Canton Div. Mr Jones was previously associated with General Electric's Hanford Works, where he served for six years as chief inspector of the AEC project.

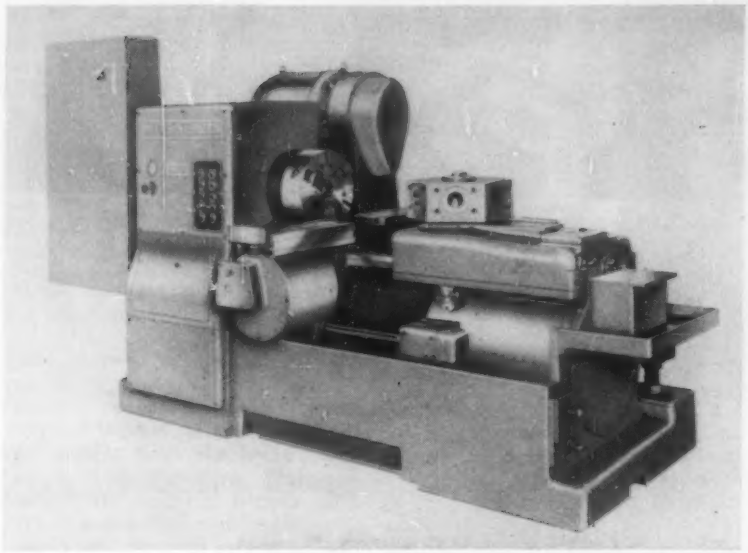
David Reid, Jr, has been appointed manager, Abrasive & Bond Plants, Norton Co, Worcester, Mass; he succeeds **Albert E Hall,** who has retired. **Robert G Clarke,** formerly assistant superintendent, will take over Mr Reid's post as superintendent.

Robert A Horner, appointed divisional manager of Barber-Colman's Machine and Small Tool Divisions, as announced in *AM* Dec 7, p188

Leo W Reuland, named sales manager of the Machine and Small Tool Divisions, Barber-Colman, as announced in *AM* Dec 7, page 188

Fred B Jensen, has been appointed production manager, Small Tool Div, Barber-Colman, as announced in *AM* Dec 7, p188

New Shop Equipment



Rugged Automatic Turret Lathe Designed for Modern Tooling

High-powered automatic turret lathe, designated Model 4U, designed primarily for rapid removal of metal with carbide tools, has been announced by Potter & Johnston.

An 8-in. A-1 American Standard spindle nose, taking chuck sizes 10, 12, or 15 in., has been adapted for the spindle, mounted in heavy-duty, precision Timken double-taper roller bearings, front and rear. Four automatic instantaneous speed changes are provided by multi-disk friction clutches, electro-pneumatically controlled by adjustable dogs on a dog drum. Spindle speeds ranging from 45.5 to 1177 rpm can be obtained through pickoff gears. Large magnetic clutch and brake, designed to give cushioned starting and stopping of spindle, allows greater flexibility in operation. These features, in addition to a 25-hp motor, enable the machine to utilize modern carbide tooling to assure fast metal removal on the toughest materials.

Large, 6-faced turret is indexed with Geneva movement and is accurately positioned by means of a large lock bolt. Tapered seat clamping arrangement in the turret slide provides a rigid base for the most rugged tooling. Slide, with a travel of 12 in., 8 in. of which is feed, is adjustable along the base ways, providing much greater tooling possibilities. Turret design permits coolant to be pumped either overhead for turning tools, or through the bars for boring and drilling.

Independent front and rear cross-slides, easily adjusted along base ways, are individually operated by large cam drums to work with any or all turret faces. Standard travel and feed of 4½ in. and auxiliary movement of 2 in. to operate turret slide tools is provided. Six automatic feed changes permit overall range of 0.002 to 0.163 in. per spindle rev to both cross-slide and turret slide.

All machine functions, including automatic changes of speeds, feeds, rapid traverse, and automatic stopping, are controlled from a conveniently located dog drum, large size of which permits easier application of dogs for reduced setup time. Base is a rugged steel weldment, with hardened and ground bonded tool steel ways.

Attachments include: slow spindle speed for drill-head pickup; slow spindle speed for spindle positioning; and reversing spindle for right- or left-hand threading with automatic tap withdrawal.

Potter & Johnston Co, Pawtucket, RI

Device Gives Choice of Readings In Measuring Surface Roughness

QA Amplimeter, developed for use with all Profilometer equipment in measuring surface roughness, indicates either rms or arithmetical average roughness height in mu-in., as selected by a switch on the panel.

Portable unit is insensitive to mechanical shock or vibration, has a 30-second warmup, and is unaffected by normal temperature changes or by line voltage fluctuations from 90 to 130 v. It has no sensitivity adjustment, and requires no calibration by operator; accuracy is checked by tracing a rated roughness specimen, furnished as standard equipment.

Unit incorporates an electronic amplifier enclosed in a metal case. Front panel carries a direct-reading mu-in. meter with illuminated dial; switch for selecting rms or arthmetical readings; and a range selector switch with a choice of six measurement ranges: zero to 3, 10, 30, 100, 300, or 1000 mu-in., permitting surfaces of less than 1 mu-in. to be measured as readily as surfaces of about 1000 mu-in. The 24-lb device is 8 in. wide x 10 in. high x 15 in. front-to-back.

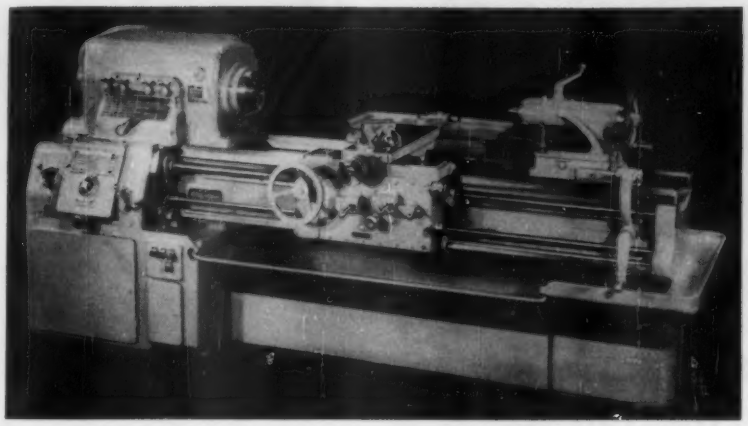
Micrometrical Mfg Co, 345 S Main St, Ann Arbor, Mich

Conveyor-Belt Coating

No. 204 Griptex, a non-skid protective coating for conveyor belts, is an oil-resistant liquid synthetic rubber coating, applied by brush or spray to new or old belts. Tough, flexible, self-vulcanizing product is available in neutral shades and in colors.

Adhesive Products Corp, 1660 Boone Ave, New York 60, NY

Materials and Parts



Monarch Lathes Feature Power Rapid Traverse

Series 61 line of engine and toolmaker's lathes includes sizes of 13, 16, and 20 in. The machines incorporate, in a full range of swings, built-in apron-controlled power rapid traverse to the carriage and cross-slide.

Other features include: totally enclosed gearbox and end gearing; automatic pressure lubrication; anti-friction bearings; helical-geared headstock; and standard Camlock spindle nose.

Longitudinal traverse, right or left, is 160 ipm; cross movement, in or out, is 75 ipm. Safety clutch is provided for all traverse movements.

Machines are also available in numerous plus-swing sizes.

The Monarch Tool Co, Sidney, Ohio

Controlled Sulfide Lubricants In Latrobe XL High-Speed Steels

Controlled sulfur additions to four steels in Latrobe's molybdenum high-speed series, are reported to provide an internal lubricant that reduces friction in the cutting process.

These sulfides are reported to be different from those in steel containing sulfur as a contaminator or those in resulphurized carbon steels (in which manganese sulfides provide discontinuities that break up chips and reduce gumminess).

Photomicrographs of the XL steels show alloy sulfides as light grey, slightly elongated spots uniformly distributed through the steel. The Latrobe "Desegatized" process for producing uniform carbide distribution is claimed to also cause uniform distribution of these sulfides.

Effect of the sulfides is reported to be a reduced tendency to form a built-up edge without impairing the cutting edge strength of the tool. This is claimed to provide increased tool life and improved surface finish.

Comparative physical tests of Latrobe's regular M-2 steel and the XL M-2 steel, show no appreciable difference in hardness and impact values.

XL steels are available in four of the molybdenum high-speed steels: M-1, Tatmo; M-2, Double Six M-2, M-3, HV-6; and M-10, TNW.

Latrobe Steel Co, Latrobe, Pa

Single-point carbide tool lapping machine known as Superior Tru-Finisher, has been designed primarily for super finishing carbide tools; tests indicate it is possible to produce 3-5 mu in. finishes quickly and efficiently. Diamond wheel grinding is unnecessary, as a narrow band on the relief and rake angles only is quickly superfinished by first rough lapping and then finish lapping.

Garrett Supply Co, 3844 Santa Fe Ave, Los Angeles, Calif

...INCLUDING

Dividing machines with accuracy of 0.00008 in. do circular, cylindrical, and linear dividing of scales, verniers, and drums and can handle worklengths up to 50 in. ..... page 142

Drilling and tapping machines with vertical-motor cone-pulley drive are available in four capacities with three or four speed ranges ..... page 142

Tube-bending machine, semi-automatic, hydraulically powered, bends 40-ft lengths to radius varying from ¾ in. to 2 ft, finned or plain ..... page 144

Motor drive accessory for surface measuring instrument has reciprocating stroke length varying from 1/16 to 2⅞ in. page 144

Brine quench unit, self-contained, provides automatic transfer of 300, 400, or 700 lb from adjoining furnace through its own brine quench ..... page 146

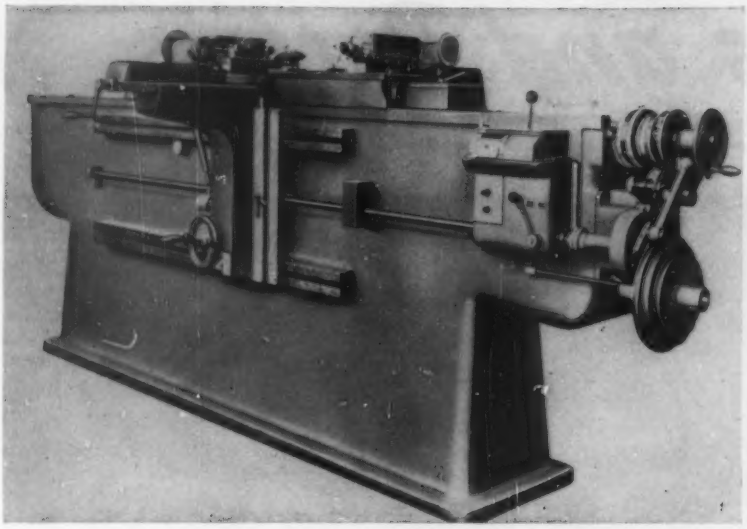
Precision gear hobbers, in four models with capacity ranging to 23 ft, cut spur, helical, herringbone gears and worm wheels page 150

Roll grinders are available in two types: with stationary wheelhead and reciprocating table; with reciprocating wheelhead and stationary table ..... page 152

...and in Jan. 18

1954 PRODUCTION PREVIEW

The 41st Annual Review of new equipment, materials, and parts described in these pages during the preceding year, condensed and classified for your convenient reference in production planning during the year ahead.



Dividing Machines Available for Production or High Precision Work

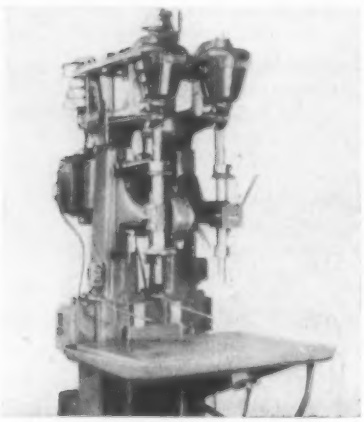
Complete line of dividing machines is available for circular, cylinder, and linear dividing of gages, scales, verniers, rules, measuring drums, dials, and similar instruments.

Units with an accuracy of 0.00008 in. (0.002 mm) are designed for high precision graduations of optical measuring equipment and machine parts. Linear machines are available for operations requiring max lengths up to 50 in.; can be used for graduation work on most materials.

Production models are sufficiently accurate for dividing operations in the general machine tool and precision engineering industry; high precision units meet degree of accuracy necessary for production of master gages and scales for measuring tools, and optical readings.

Operation is fully automatic. Marking mechanism is easily adjusted; graduations can be made in inches or metric systems, as well as for any special calibrations.

William J Hacker & Co, 82 Beaver St, New York 5 NY



Edlund Redesigns Line of Cone-Pulley Drilling Machines

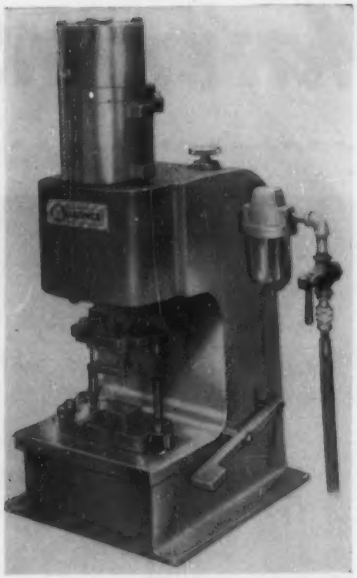
Four new models in the Edlund line of model B vertical-motor cone-pulley-drive drilling and tapping machines are: 1B with 7- or 12-in. overhang; 2B with 8-in. overhang; 3B with 12- or 15-in. overhang; and the 4B with 12- or 16-in. overhang.

The 1B machine has three speed ranges from a low of 500-1540 to a high of 995-2080 rpm. The other machines have four speed ranges. The 2B and 3B series have a low of 240-1000 and a high of 565-2380 rpm. The 4B machines have a low range of 80-1002 and a high of 161-2004 rpm.

Drilling capacities are: model 1B, $\frac{5}{8}$ in.; models 2B and 3B, $1\frac{1}{4}$ in.; model 4B, $1\frac{1}{2}$ in. The 1B is available with any number of spindles from 1 to 6. 2B and 3B have 1 to 8 spindles, 4B has from 1 to 4 spindles. Model 4B is made in both pedestal-mounted and bench-type machines.

These machines are said to be outstanding for rugged construction and simplified operation. They use a standard ball-bearing-type motor of either open or totally enclosed design. With the back-gear attachment on all but the 1B machines, a lower range of additional spindle speeds can be attained.

Edlund Machinery Co, Cortland 2, NY



Portable Hydraulic Bench Press Delivers Five Tons of Pressure

Small size, air-oil combination hydraulic bench press, capable of delivering 5-ton pressure when connected to a 100-psi airline is being marketed by Alliance.

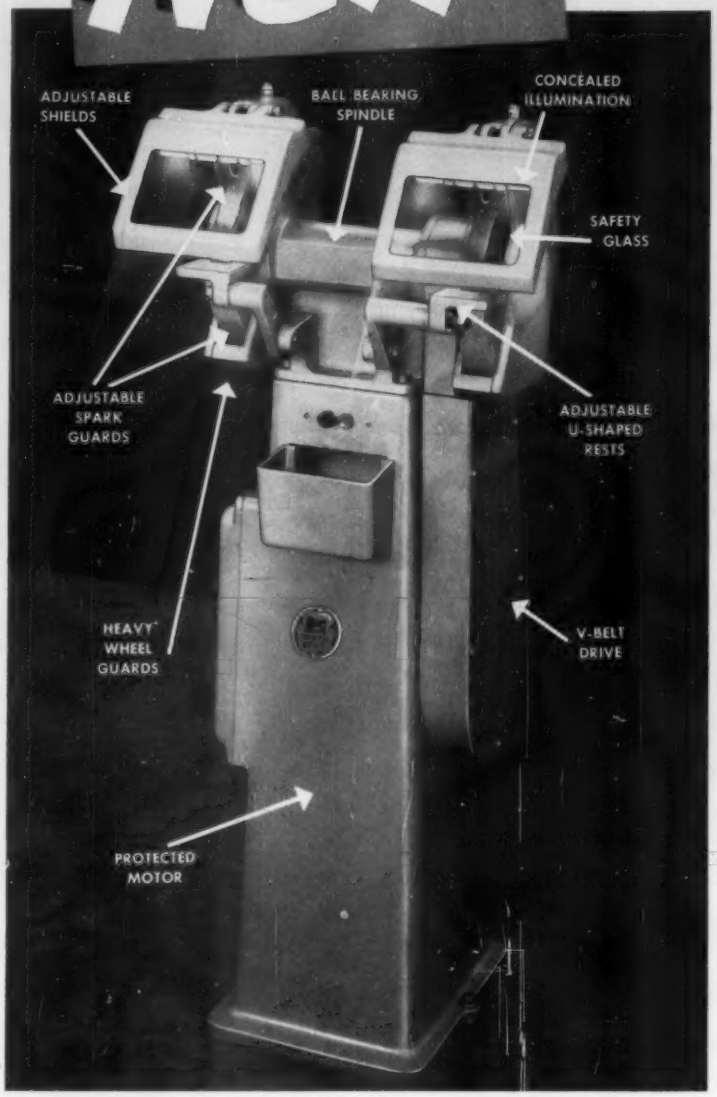
Model 500 Pnu-draulic weighs only 300 lb, can be attached to any convenient shop airline, has no motor, and uses no electric power, pumps, nor cooling water, occupies only 1 1/3 sq ft of bench space, making it particularly adaptable to line production, and is especially suited for areas with low headroom.

Pressure is generated by an integral air-actuated booster. Press operates on dual-pressure system, the ram being lowered and raised under low pressure with the high pressure kicking in only during the short distance required to perform the operation. Pressure range is 100 to 10,000 lb. Average consumption is $\frac{1}{4}$ cu ft of air per stroke.

Press differs from mechanical punch presses in that work is done under a preset amount of exerted pressure instead of a downward stroke to a fixed position, enabling parts of varying thicknesses to be assembled with uniform results. Exerted pressure is adjustable to max rated power, which is determined by airline pressure, and cannot be exceeded. Once ram is set, it will repeat with near-perfect accuracy. Model is equipped with an automatic timer for cycle control and dwell time at bottom of stroke. Stroke is adjustable from 3 in. to zero.

Alliance Manufacturing Co, Alliance, Ohio

New SOUTH BEND Pedestal GRINDER



You will find this new grinder ideal for precision tool grinding. It is ruggedly built throughout to withstand hard service. The motor is enclosed in the pedestal and drives through a V-belt which removes the load and weight of the grinding wheels from the motor bearings, practically eliminates vibration and isolates the motor from abrasive dust.

Send coupon for complete information on this grinder that will give you long, trouble-free service.

SPECIFICATIONS

Wheel Size: 8" dia. (½ h.p. motor), 10" dia. (¾ h.p. motor).

Spindle: Approximate speed 2450 r.p.m. Sealed ball bearings.

Motor: Standard 2875 r.p.m. 50 cycle or 3450 r.p.m. 60 cycle, also D.C.

Over-all Dimensions: 8" Grinder, 49½" high, 18" wide, 20½" deep. 10" Grinder, 49½" high, 18½" wide, 20½" deep.

8" wheel size. Pedestal Grinder— **$245.00**

10" wheel size, Pedestal Grinder— **$248.00**

f.o.b. factory, less motor and remote control equipment. Time terms: 10% down, balance 12 months.

Can I get it? When? How?

Yes—you can get most any South Bend product immediately from our distributor's stocks in principal cities. Items not stocked, shipped promptly from factory.

Three ways to order:

1. See or telephone nearest distributor.
2. Order by mail from your distributor.
3. If no distributor is nearby, order direct from factory.

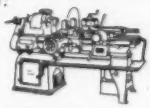
South Bend machine tools with accessories may be purchased on convenient terms up to 12 months.

PLEASE SEND INFORMATION CHECKED:

☐ 9" and 10" BENCH LATHES

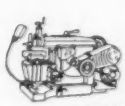
☐ 10" to 16-24" FLOOR LATHES

☐ DRILL PRESSES



☐ ½" & 1" Collet TURRET LATHES

☐ TOOL GRINDERS

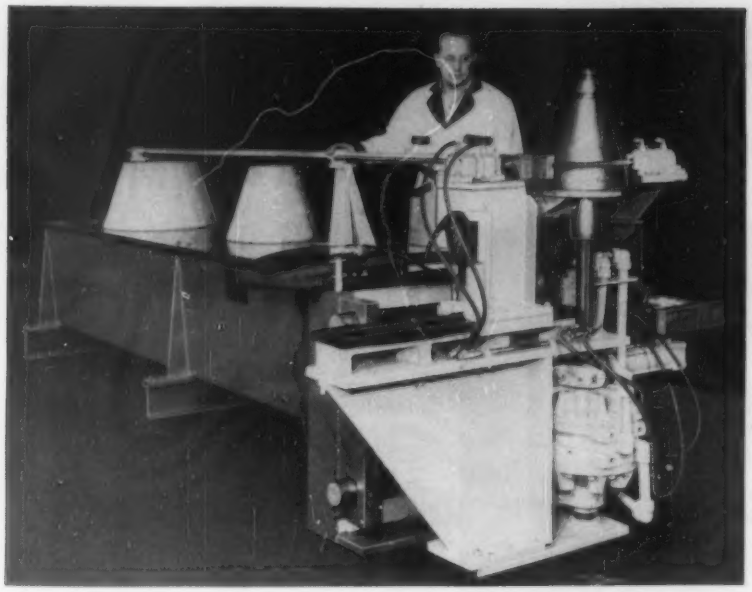


☐ 7" BENCH SHAPERS

Name _____ Company _____

Street _____ City & State _____

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana



Semi-Automatic Unit Bends Tubing On Radii from 3/4 in. to 2 ft.

Semi-automatic hydraulic-powered machine that makes bends varying from ¾-in. to 2-ft radius in finned or plain ferrous and non-ferrous metal tubing up to 40 ft long has been added to the Hill line.

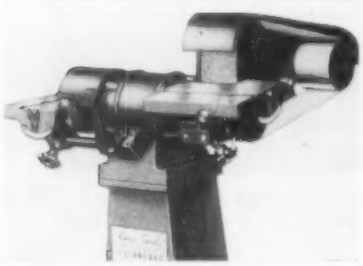
Unit bends tubing up to 1½-in.-dia around a cone-shaped steel die, adjustable both vertically and horizontally, to provide bending radii in infinitely variable increments within the large and small diameters of the cone. Larger bend radii up to 2 ft are attained by nesting hardwood cones of larger sizes over the conical steel die; four of these provide the 2-ft range. Bending table is powered by a high-torque, positive-displacement, single-vane, 1-rev hydraulic motor. Smooth action permits bending of finned or plain copper tubing on an 11-in.-dia without annealing.

Motor is mounted with its shaft vertical on a base supported by round guide bars on end of machine. Motor base can be traversed at right angles to the holding tube by a hydraulic cylinder, permitting bending die centerline to be moved sideways for varying conical die radii. Conical bending die is mounted on end of the telescoping, hydraulically controlled, splined hydraulic motor shaft. Locking die is slide-mounted on bending table, enabling it to be adjusted and locked in correct bending radius location.

Bending table travel is adjustable to allow overbending and to counteract tube springback problems. Bend radius adjustments as small as 0.001 in. can reportedly be made in a matter of seconds. Three manually operated hydraulic valves control all adjustments and bending cycle.

Semi-automatic adjustable radius cone bender is powered by a Hill No. 3 hydraulic power pack. Unit has a 30-gpm, 1000-psi pump driven by a 15-hp, 1725-rpm motor. Machine is 16 ft long, 7 ft wide, and 4¾ ft high.

Walter P Hill, Inc, 22183 Telegraph Rd, Detroit 19, Mich



Carbide Tool Grinder Has Dual Wheel-Belt Design

The Vari-Tool finisher is said to offer an advantage to small and medium shops grinding HSS or carbide tools. The solid carbide platen permits micro-finish of end, top, and side clearance angles on single-point tools.

The right side of the machine consists of three pulleys with a 54x4-in. abrasive belt protected by a steel guard. Torque-screw adjustment is provided for belt tension.

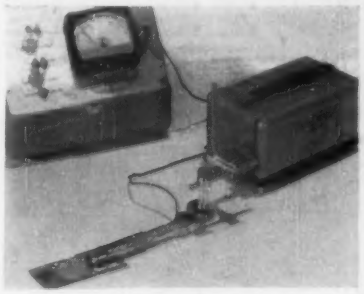
The left side has a 6-in.-dia plate-mounted cup-type wheel for the roughing operation. Each side of the machine is equipped with a 10x7-in. tilting table with graduated indicator.

The Standard Electric Tool Co, Cincinnati 4, Ohio

Shield for Paint Booths

Spray booth shield is a substance developed to protect inner surfaces of booths as well as turntables and stands so that accumulated paint overspray may be removed easily and quickly. Paste-like, milky-white product can be applied to any surface by brush, trowel, or knife to a thickness of about 1/16 in. May be covered by any common type of paper; when overspray builds up paper can be stripped off by hand or with a scraper and new paper applied. When shielding material is used alone, both paint and it can be removed with scraper or putty knife. Booths can be used immediately after application; it is available in 5-gal. cans and drums.

Thompson & Co, Allegheny Ave, Oakmont, Pa



Mechanical Tracing Accessory Extends Surfindicator's Range

Brush motor drive Model BL-114 is a mechanical tracing accessory for use with the Surfindicator instrument for measuring surface roughness. Device provides mechanical movement of the Surfindicator pick-up along surface being inspected.

Reciprocating stroke, with length adjustable from 2⅞ to less than 1/16 in., permits extremely wide range of measurements. Stroke speed is ⅛ in. per second. Instantaneous reversal, constant speed, and low vibration level of the unit are said to insure measurements of highest possible accuracy. Drive is particularly recommended for inspection of large quantities of similar parts, very fine finishes, and very small areas.

Brush Electronics Co, Equipment Div SP, 3405 Perkins Ave, Cleveland 14, Ohio

ELGIN DIAMOND

meets rigid quality standards

at Allegheny Ludlum Steel Corporation, Pittsburgh

When wire is pulled through carbide dies, tremendous heat and pressure are generated. That is why the working surfaces of wire drawing dies must be polished to a near perfect finish. That is why Allegheny Ludlum uses Elgin Diamond.

Elgin Diamond assures the finest possible finish—and in less time—because all Elgin Diamond is precision graded and permanently suspended in a color-identified compound right in the Elgin laboratories. There are no oversize particles to scratch, no "fines" to decrease cutting efficiency.

Hundreds of die finishing applications prove Elgin Diamond reduces costs and produces a better finish every time . . . in less time! Now is the time to try Elgin Diamond and prove it to yourself!

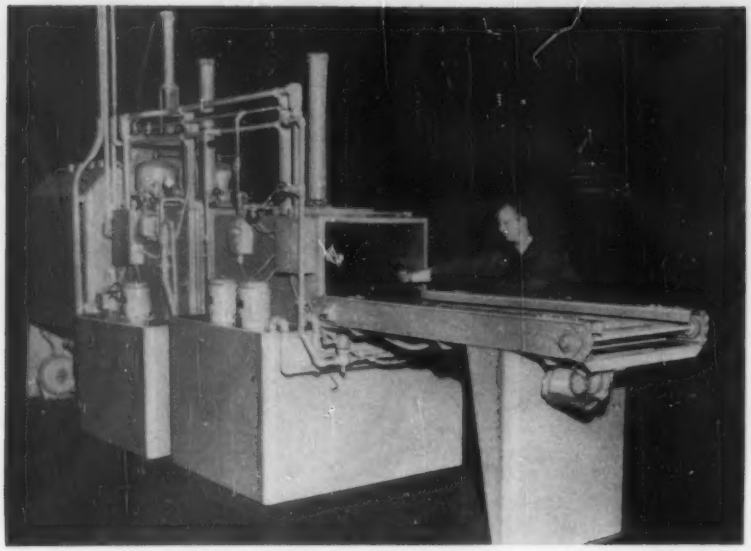
Ask for a free demonstration!

ABRASIVES DIVISION

ELGIN NATIONAL WATCH COMPANY

Dept. B

ELGIN, ILLINOIS



Ipsen Brine Quench Unit Allows Automatic Cycling

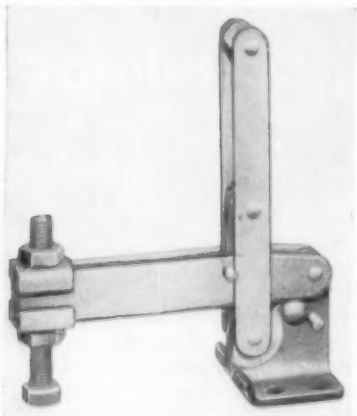
Self-contained unit was developed for use with Ipsen series T metal-treating furnaces.

Load capacities of three models are 300, 400 and 700 lb. The setup provides automatic transfer of work load from adjoining heat-treating furnace through its own brine quench. Solution temperatures, work handling, and solution circulation are controlled automatically by presettings on controls built into regular furnace control panel.

The unit is located at the rear of the furnace. As the intermediate door closes, the rear door opens and chain-driven rods move into the furnace quench zone, contact the load with cam-actuated arms, and pull the work tray to the brine tank where the tray is immersed. The quench rack is held, immersed, and raised by an air cylinder.

With this setup, the work tray ends up in the brine quench whether oil quenching, atmosphere cooling, or brine quenching has been designated. If one of the first two conditions has been preset, the work stays in the furnace quench zone for the quenching or cooling time and then moves to the new unit for unloading.

Ipsen Industries, Inc, 715 S Main St, Rockford, Ill



SMALL-SIZE KNU-VISE CLAMPS are available: Model V-100 has vertical handle and horizontal mounting surface; Model S-100 is for side mounting. Both have clamping force of 100 lb with spindle located at end of toggle bar—*Lapeer Mfg Co, Lapeer, Mich*

Titanium Locknuts

Elastic Stop Nut Corp will use titanium to fabricate commercially available locknuts. Although the difference in weight between individual steel and titanium nuts is measured in ounces, the total weight saving on an airframe is appreciable.

First units in the line will be double-hex nuts with nylon locking inserts, sizes from 5/16 to 5/8 in. A special permanent coating has been developed to provide lubrication and increase resistance to galling and seizure.

Elastic Stop Nut Corporation of America, Union, NJ

Acetogen Gas for Flame Cutting

Acetogen finds applications in such operations as cutting, annealing, case hardening, aluminum welding, scarfing, brazing, rivet burning, and silver soldering.

The cost is said to be from 30 to 50% of that of acetylene and cutting action as fast. Advantages claimed include: smoother cuts with sharp, clean edges; soft cuts, low Brinells, no carbon input; quick preheating; cutting speeds and pressures equal to acetylene; no tendency to backfire; non-toxic and non-injurious; one cylinder weighs 120 lb; only change in equipment involves the tips which are made by Acetogen to fit all torches. Range of flammability is 7.8%; explosive range 2 to 10% in air.

Acetogen Gas Co, 20137 Sherwood, Detroit 34, Mich

Helicarb End Mills Jump Production

Sonnet line of helical carbide end mills are reported to give three to ten times more production than comparable carbide-tipped cutters and finishes of 20 rms or better. They feature cutting with a shearing action due to the high helix angles that can be used.

Tools are available in six standard sizes ranging from 1½ to 4 in. in dia for steel and non-ferrous cutting. A key-drive 50-mm nose-type adapter has been designed for use with these end mills.

It is reported that tests on 4130 heat-treated steel show that these cutters removed 23.6 cu in. per minute on a 20-hp milling machine.

Sonnet Tool & Mfg Co, Hawthorne, Calif

SW-65

Bar No. 4512-1
¼" electrode
on D.C. Reverse
As Welded

Outstanding physicals recommend the A. O. Smith SW-65

low-hydrogen electrode

Here is a picture of an all weld metal .505 of the A. O. Smith SW-65 low-hydrogen electrode. Remarkable strength, superior ductility and exceptional elongation put this electrode in a class by itself.

Nominally an E6016 electrode, it far exceeds A.W.S. specifications for this class. It is used in many applications as an E7016 because of its superior physicals.

Its better manipulation, lack of spatter, easy re-strike, quick cleaning slag and fine appearing bead make it an operator's favorite from the very first trial.

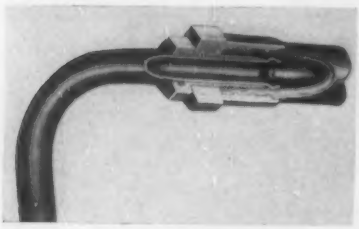
With SW-65, you have the exceptional electrode for welding cold-rolled steel, re-rolled rail, high carbon, sulphur, selenium bearing steels and steels of poor weldability.

This is the electrode to use with confidence whenever there is any doubt about weldability, and where you desire high physical and x-ray quality.

May we suggest that you write us or contact your local A. O. Smith distributor for full details and a chance to test this remarkable low-hydrogen electrode.

A.O.Smith
CORPORATION

WELDING PRODUCTS DIVISION, MILWAUKEE 1, WISCONSIN
INTERNATIONAL DIVISION: MILWAUKEE 1, WISCONSIN

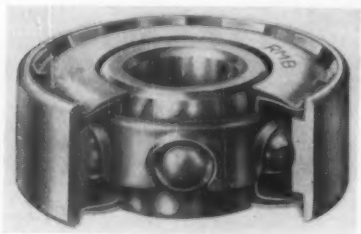


Re-Usable Hydraulic Coupling

A re-usable coupling has been developed for the fluid power field by Maeward Couplings. Designated Stemlok, the coupling provides a simple, inexpensive method of connecting hydraulic tubing to pressure hose from ¼ to 2 in. ID.

Unit permits maximum use of low-cost tubing and eliminates need for special adaptor couplings. Easy positioning is assured and very close tolerances are unnecessary because of 360° rotation of tube after assembly. Fast, easy assembly and 90° tube bends within ½ in. of coupling are additional features. Unit is guaranteed to withstand burst pressure of hose without danger of bead collapse or blowout; O-ring seal prevents static or impulse pressure leaks.

Distributed by Powertube Engineering Co, Olivet, Mich



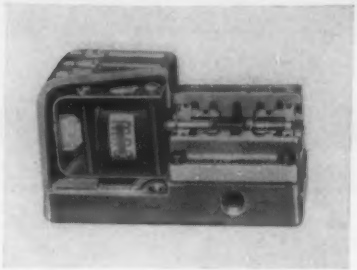
Miniature Ball Bearings Available in R-2 Size

RMB miniature ball bearings are now available in the R-2 size with 0.3750-in. OD; 0.1250-in. bore; 0.1562-in. width. They can be furnished in two basic constructions and ten different types.

Bearing illustrated, RMB Type RF 864 S-5-14, made to ABEC-5 tolerance, with a one-piece snap-design ball retainer, is especially recommended for low-torque, medium-speed applications; also available with a two-piece ribbon-design ball retainer for high speeds.

Five of the R-2 size bearings, designated RF 864 series, incorporate the RMB capillary Filmoseal closure, assuring lubrication over a wide range of temperatures. Capillary principle permits use of oil as a lubricant, rather than grease, resulting in less torque at low temperatures, retention of lubricant at elevated temperatures, and bearing protection during storage and assembly. The R 864 series includes bearings without seals. Both are available in ABEC 1, 3 and 5 tolerances.

Landis & Gyr, Inc, 45 W 45th St, New York 36, NY

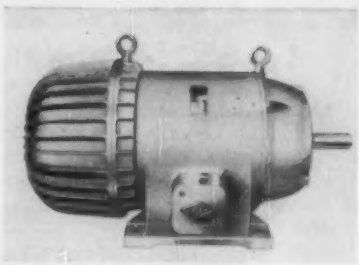


Solenoid-Operated Air Valve Has Newly Designed Construction

Solenoid-operated 4-way air valve, called the Macsolenoid, incorporates a floating C-frame design. Frame of the solenoid is cushioned in shear-loaded Hy-car rubber inserts, and has no metal-to-metal contact with the stationary outer bracket. Excess energy of the plunger on closing impact is thereby absorbed. Four mounting screws, isolated from vibration, are the only means of securing entire assembly.

One moving part minimizes downtime and adds to life. All internal passages are as large or larger than ID of pipe sizes. Field reports indicate 400 to 500 cpm, and life length in excess of 8,000,000 cycles.

Mechanical Air Controls, Inc, 10030 Capital, Oak Park, Detroit 37, Mich



High-Velocity Fan-Cooled Motor Is Compact, Lower-Cost Unit

Line of Reuland motors incorporates a high-velocity internal cooling fan. Because of greater cooling capacity, much higher horsepower ratings can be obtained from lower cost, small frame sizes. Price reductions of as much as 15% are said to be achieved.

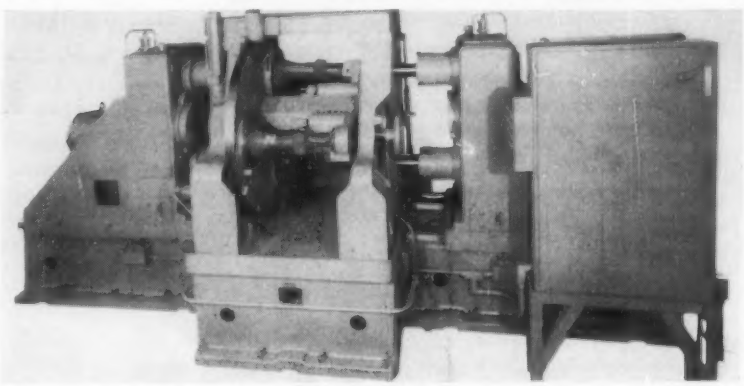
The 30-hp model illustrated, which ordinarily requires a No. 365 frame, is built into a No. 326 frame. Fan, 13-in. dia x 7⅞ in. wide, is mounted on the motor's shaft and is housed within the special fin endbell. Air is sucked in through a screen filter opening and blown with great force over all internal areas.

Units, available in ratings from 15 through 30 hp, are of drip-proof construction and can be furnished with either a standard single-end shaft or special hydraulic pump mount endbells.

Reuland Electric Co, Alhambra, Calif

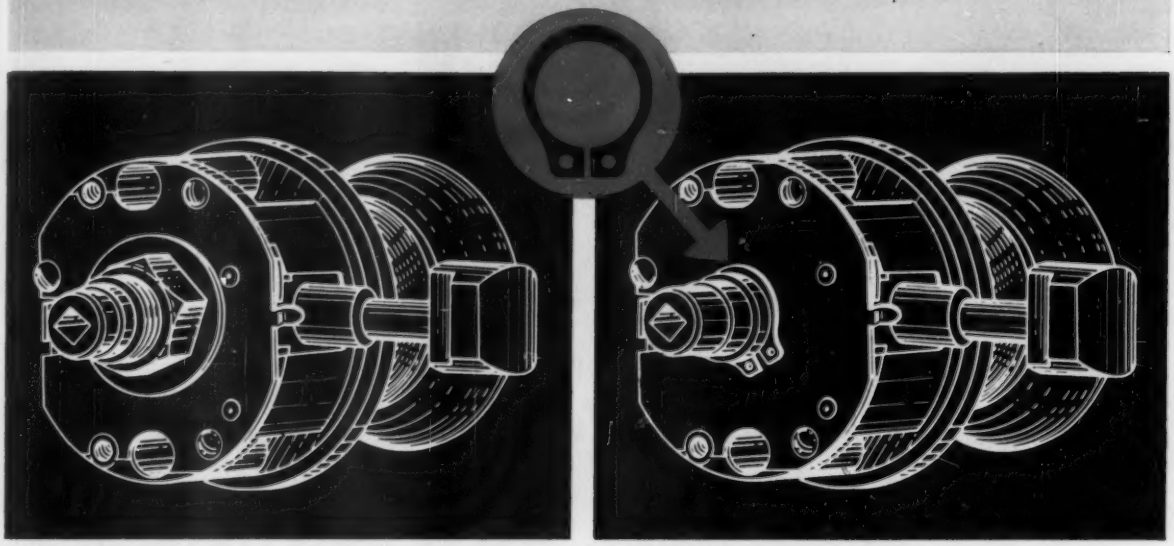
Van Keuren chrome carbide taper insert plug gages are available in sizes from 0.500 to 1.500-in. dia. They are manufactured to standard X, XX, and Y tolerances, and gage finish will average 0.5 rms.

The Van Keuren Co, 176 Waltham St, Watertown, Boston, Mass



HORIZONTAL HYDRAULIC-FEED MACHINE semi-finish- and finish-bores right- and left-hand rear axle housings for tractors. Two spindles are mounted on each spindle head. Between the boring units is a three-station hydraulically indexed, electrically controlled trunnion-type fixture with two working stations and one loading station. The hydraulic feed cycle is automatic once started by the operator. Production rate is 80 parts per hour — *Moline Tool Co, Moline, Ill*

Waldes Truarc Ring Replaces Nut and Washer ...Cuts Costs $5.28 Per M...Speeds Assembly by 50%



OLD WAY. Main shaft required costly threading. Assembly was slowed by the double application of washer and nut and time-consuming tightening operation.

TRUARC WAY. Truarc Retaining Ring snaps quickly and simply over shaft. Lock assembly is secured in one fast operation. Virtually all play is eliminated from lock.

NEW DESIGN USING WALDES TRUARC RING PERMITTED THESE SAVINGS

OLD WAY

Cost of Nut	$10.00	per thousand
Cost of Washer	3.80	" "
Labor for Threading	2.00	" "
Assembly	3.00	" "
TOTAL	$18.80	

TRUARC WAY

Cost of Truarc Ring and Grooving Operation	$11.52	per thousand
Assembly	2.00	" "
TOTAL	$13.52	

J. Chesler and Sons, Inc., Brooklyn, N.Y., manufacturers of the pre-assembled "Reddi-Mount" cylindrical lockset, uses a single Waldes Truarc Retaining Ring instead of an old fashioned nut and washer to secure the entire assembly of their lock. This new, improved fastening method enables Chesler to eliminate costly threading ... save money on material ... speed assembly time by 50% and produce an improved, more durable product.

You, too, can save money with Truarc Rings. Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better, more economical job. Waldes Truarc Rings are precision-engineered ... quick and easy to assemble and disassemble.

Find out what Waldes Truarc Retaining Rings can do for you. Send your blueprints to Waldes Truarc engineers.

For precision internal grooving and undercutting... Waldes Truarc Grooving Tool

SEND FOR NEW CATALOG

WALDES

TRUARC

REG. U. S. PAT. OFF.

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS AND PLIERS ARE PROTECTED BY ONE OR MORE OF THE FOLLOWING U. S. PATENTS: 2,382,947; 2,382,949; 2,416,852; 2,428,341; 2,439,785; 2,441,848; 2,455,165; 2,470,941; 2,483,380; 2,483,383; 2,487,802; 2,487,803; 2,491,308; 2,509,081; AND OTHER PATENTS PENDING.

Waldes Kohinoor, Inc., 47-16 Austel Pl., L. I. C. 1, N. Y.

Please send me the new Waldes Truarc Retaining Ring catalog.

(Please print)

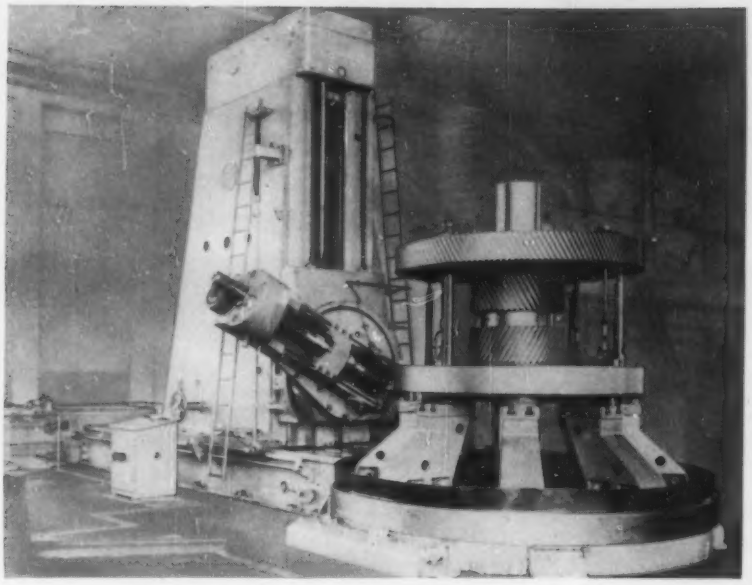
Name.....

Title.....

Company.....

Business Address.....

City..... *Zone*..... *State*.....



Gear Hobbers Capacity Ranges to 23 ft

Schiess RF precision gear hobbers are adaptable to the cutting of spur, helical, and herringbone gears and worm wheels. Four models have capacities 9 ft 10 in., 13 ft 2 in., 18 ft, and 23 ft. Design incorporates fixed table capable of supporting gear blanks ranging from 20 to 80 tons. A moving column is adjustable for diameter of gear and depth of tooth. The swivel head is carried on a hob saddle traveling on the vertical ways and balanced by counterweights.

Spur gears are cut by driving the worktable through index change gears connected with the hob spindle drive. In cutting single helical gears or double helical gears with teeth separated by a gap, the additional movement of the table is accomplished by change gears.

Herringbone gears are cut with end mills by replacing standard spindle and changing drive from hobbing motion to indexing by means of a lever. A second lever initiates the indexing.

Worm wheels of low lead angle are cut with parallel hobs by radial feed method. For high lead angles, work must be cut with tapered hobs and axial feed.

Imported by Kurt Orban Co, Inc, 205 E 42nd St, New York 17, NY

Automatic Gage Inspects Ten Simultaneous Diameters

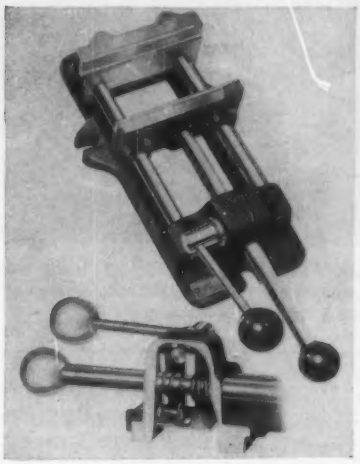
Automatic gage for simultaneous inspection of ten dimensions on an automobile piston at a rate ranging from 400 to 800 pistons per hr has been developed by Sheffield. Unit, requiring no special skills for operation, incorporates a pneumatic and electrically timed loading mechanism which carries piston into and out of gaging station; it can be loaded manually, if desired.

Multichek gaging machine inspects the following diameters: top land, top groove, second groove, bottom groove, bottom land, and determination as to whether bottom skirt dia and top skirt dia are same size and within tolerance. Also inspects width of top, second, and bottom groove.

Colored lights indicate whether points of inspection are oversize, undersize, or within tolerance. When all dimensions are within tolerance, master light remains white and nine signal lights black out. However, if one or more are out of tolerance, master light turns red, a bell rings and signal lights indicate faulty dimensions by turning red or green, indicating respectively undersize or oversize; lights of correct dimensions black out.

Bottom and top skirt dia are gaged by means of an air ring connected to a double-column Precisionaire. Floats in the two glass columns are balanced so they will be in parallel position when bottom skirt is same size as top skirt dia, with any deviation from plus or minus 0.00025 tolerance being read on graduated scales.

Sheffield Corp, Dayton 1, Ohio



Instant-Action Vise Clamps Compressible Materials

Series of instant-action Grip-Master vises that permits clamping of compressible materials normally requiring slow-action screw vises has been added to Heinrich Tools' standard SV series. New PA series, incorporating pumping action locking mechanism, is available in four models with 3-, 4-, 6-, and 8-in.-wide jaws.

All Grip-Master units advance the jaw forward against object to be held with the initial downward press of the locking lever, exerting holding pressures up to 1500 lb. In the PA series, by releasing the locking lever to a 60° to 80° angle, jaw is held against the work with a pressure of from 200 to 350 lb, allowing an additional forward motion of the jaw by pumping the locking lever. Vises compress and securely hold such difficult materials as steel laminations, warped castings, and plastics.

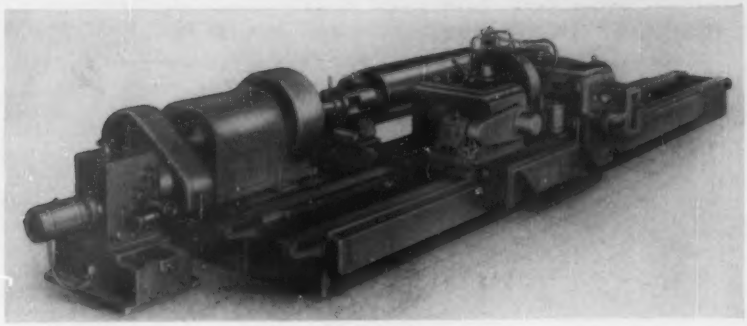
Heinrich Tools, Inc, Racine, Wis

WHEN IT COMES TO PRODUCTION . . .

. . . come to HARTFORD Special

AUTOMATIC DRILLING & TAPPING MACHINES

THE HARTFORD SPECIAL MACHINERY CO. • HARTFORD 12, CONN.



Roll Grinders Designed To Eliminate Backlash

Schmaltz roll grinders are available in two types: type WR with stationary wheelhead and reciprocating table for roll diameters to 31 in. and crowned lengths to 8 ft 2 in.; type WRG with reciprocating wheelhead and stationary worktable for roll diameters to 63 in. and crowned lengths to 26 ft.

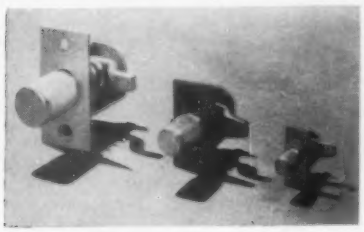
The outstanding feature is claimed to be the crowning mechanism designed to eliminate backlash. Reportedly crowns can be obtained with accuracy from 0.0002 in. to 0.040 in.

Wheel infeed for rough and finish grinding is obtained by two separate handwheels which move the wheelhead 0.02 and 0.0004 in., respectively, per full turn. The wheel drive motor is mounted separately. All moving parts are automatically lubricated.

The work spindle is driven by a variable-pitch pulley mechanism providing for infinitely variable work speeds.

Both models are built to American standards.

Imported by Parker Machine Co, 158 Pioneer St, Brooklyn 31, NY



Adjustable Pawl Fasteners Available in Three Sizes

Southco adjustable pawl fasteners, for quarter-turn closure or opening of hinged doors and panels on machinery and equipment, are available in three sizes and head styles, meeting requirements for most machine and electronic requirements. Quick, simple installation, freedom from need of precision adjustment, and ready adaptation to any door or frame thickness are said to speed production while reducing labor costs.

Two types of pawl adjustment are available: adjustable, which tightens or loosens contact with the door jamb with an additional turn or two on the head as desired, and the fixed pawl, preset at installation to the desired contact gap and tension. Knurled knob and T-bar heads are furnished for convenient hand operation of fastener, and a slotted flush head is made for screwdriver operation. Gasket, making the fastener watertight, is also provided where needed.

Southco Div, South Chester Corp, Lester, Pa

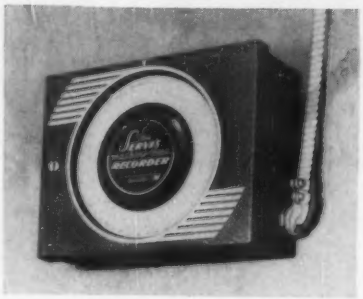
Electric Radiant Element for Industrial Oven Heating

Clepco radiant heaters, which emit rays in the far-infra-red field, have been designed for baking, curing, drying, plasticizing, and other heat processing where temperatures of 400 to 500 F are required. On applications such as heat treating and carburizing, where higher temperatures are required, heaters with ratings up to 1600 F can be supplied.

Single heating unit consists of an acid-proof, fused quartz tube, 48 in. long, in which is encased a heavy-duty nickel-alloy heating element. Panels and assemblies are made up from multiples of these units. Capacities of individual units range from 100 to 1000 w per linear ft. Heaters are available in single units or multiple sections with various panel arrangements for complete oven assemblies. Heating efficiency and uniformity are said to be greater because the far-infra-red radiation has no hot or cold spots.

Units are available in a series of standard lengths and capacities to facilitate replacing in ovens where open type or bulb heaters are not entirely satisfactory for new processing techniques.

Cleveland Process Co, 1965 East 57th St, Cleveland 3, Ohio



Servis Recorder Indicates Busy, Idle Machinery Time

Model M Servis recorder has been designed to provide an immediately visible record of busy and idle time of plant machinery; it is also purposed to set rates in time studies, or as a check on exactness of processing operations.

Recorder can be located anywhere, because it requires only a wire connection to machine's motor; it can be seen as machine operates. Sapphire stylus marks on wax-covered chart, eliminating ink or pen. Standard 6-in.-dia, 24-hr chart will revolve three times, making a triple record of days and nights on a single chart; twelve-hour and eight-hour charts are also available. If desired, an elapsed timer or counter is included in the recorder.

The Service Recorder Co, 1375 Euclid Ave, Cleveland 15, Ohio

ROUND TABLE Discussion

WHEN IS A TOOLMAKER

Is it justifiable to promote machinist to toolmaker if the man has never served a formal apprenticeship? If he proves equal to the job, shouldn't his lack of apprenticeship be overlooked in favor of ability?

INSTEAD OF WORRYING where to get toolmakers when there are so few apprentice training programs, it might be wise to adopt one of the newer ideas in industry to break down toolmaking into skilled and unskilled parts. This permits a number of men to work on a rush job, resulting in tools in a shorter time, for less money, and with the same accuracy as before.

The current shortage of skilled toolmakers poses a serious question for many metalworking plants. In some cases the bottom of the manpower barrel is visible. The question then is what to do when the bottom is scraped. Should you scrape on through and attempt to use what is underneath? Perhaps—but there may be an answer to this problem in breaking down the job into skilled and unskilled parts and going ahead on that basis.

As virtually few experienced toolmakers are available on the market, it is apparent that experienced toolmakers must be assisted by relatively unskilled help. To meet this new demand, a company should take a close look at its toolmaking jobs to see just what they require in the way of skill and knowledge. First the job should be broken down into its various parts. As each component is smaller and simpler than the whole, it will be possible to train relatively unskilled individuals to do the lesser jobs. Thus the original nucleus of highly skilled and experienced toolmakers will be enabled to concentrate on the creative aspects of the job, while time-consuming detail work could be carried out by newly trained personnel.

It might be a good idea to create toolmakers from machinists, as a means of alleviating the shortage of toolmakers. To pick men with a "good toolmaker's eye" out of a number of applicants, a training program may have to be established. All prospective toolmakers should be put through a six-week course of on-the-job orientation, spending

here it is!

Hook and heel jaws triple-heat treated for correct hardness

Newly designed spring insures instant grip and release... remains in handle when hook jaw is removed... easily snapped out for cleaning.

Teeth machined to correct shape and pitch for positive grip

THE New ARMSTRONG BRIDGEPORT PIPE WRENCH

Electrically heat treated handle for maximum tensile strength.

All parts (except newly designed spring) interchangeable with similar wrenches.

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The Best...Costs Less...to Use

• When you use WILSON "*Rockwell*" Hardness Testers to check your products during various stages of manufacture, you will *be sure*. You will prevent costly complaints from your customers. The long experience of WILSON'S Standardizing Laboratory engineers is your assurance of top quality and accuracy in the "*Rockwell*" Testers you buy.

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1 Totally enclosed, dirt and dust-proof "Zerominder" dial gauge
2 Gripsel clamp screw for quick change and proper seating of penetrator
3 All controls grouped conveniently
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WILSON "ROCKWELL" and TUKON Hardness Testers

time in the tooling departments. After this thorough acquaintance with the problems of tooling for production, many may show aptitudes for toolmaking which they themselves never dreamed of having. Training machinists to become toolmakers may not prove to be exceptionally difficult. By relating training closely to the work to be done, instruction time can be shortened. Brief, on-the-job, supervised learning makes up the program.

So, when you scrape wood at the bottom of the toolmaker barrel, perhaps the answer is not to scrape through and use what is underneath. Perhaps the real answer is to get your head out of the barrel and look around. There may be other barrels, as for example, the machinist's barrel. Of course, what's in them won't have the same part number, nor the same finish, and it won't look like what you're after. But it may be something that will do the job without much reworking. And it may save you a great deal over starting from scratch.

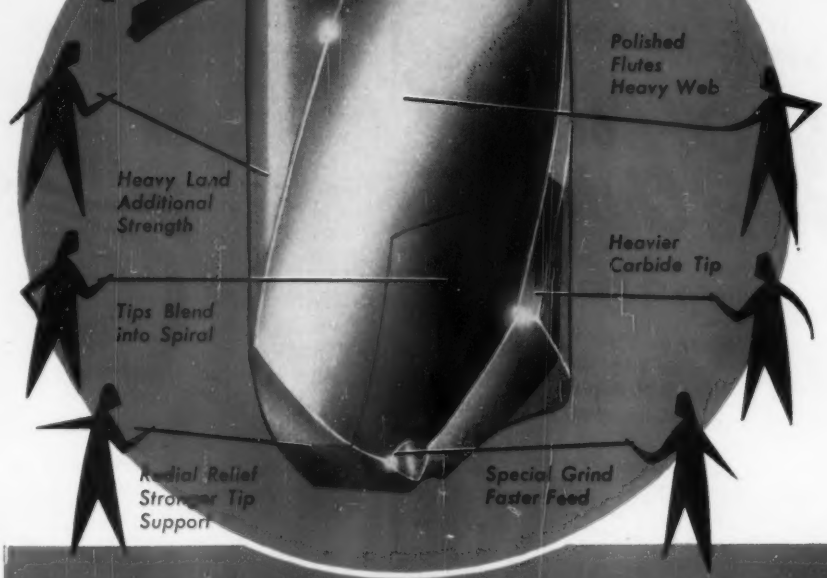
In my opinion, machinists can be fairly promoted to toolmakers, provided they have the basic skills and ability, and need only the application of brief and carefully supervised on-the-job training to orient them in the new jobs. I don't believe that serving a formal apprenticeship should be a major requirement for becoming a toolmaker.

In the case under discussion, relative to the rest of the men in the toolroom being sore about the transfer of Judson the machinist to the

STC

For Every Carbide Drilling Application There's a STANDARD SUPER DRILL

NEW and really super!



Six points of superiority— Result of two years' research. Extensive tests indicate it's the most durable and the fastest cutting carbide twist drill developed to date. Feeds as high as 8" per minute in cast iron have been obtained. Stocked in fractional, wire and letter sizes for your convenience.

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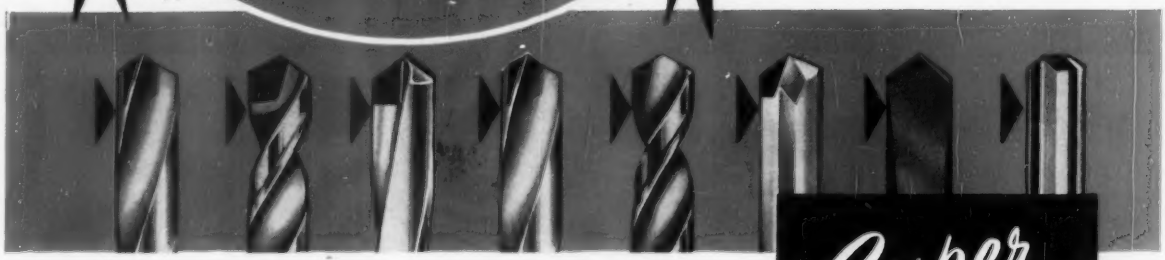

QUALITY CARBIDE TOOLS

Super TOOL COMPANY

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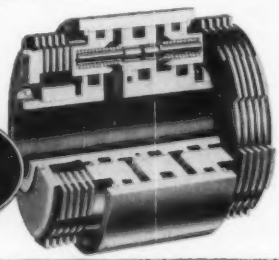
Giddings & Lewis Standardizes on . . .

New Twin Disc Oil-Actuated Multiple Plate Clutches!

For *more constant* torque . . . *longer* wear life . . . *higher* capacity for size . . . *elimination* of adjustment . . . and remote control at *less cost* . . . Giddings & Lewis have standardized on the new Twin Disc Oil-Actuated Multiple Plate Clutch for their "50 Series" Horizontal Boring, Drilling and Milling Machine. Giddings & Lewis—who worked closely with Twin Disc on pilot installations—will utilize two Model MOD (duplex) and four Model MOS (single) Clutches on their "50 Series."

Write to Twin Disc for information on how this all-new Oil-Actuated Multiple Plate Clutch might be applied to *your* machines.

Below, new Model MOD (duplex) Oil-Actuated Multiple Plate Clutch provides consistently longer wear life. Floating or pressure plate is ram of cylinder. As stack wears, ram travel increases automatically.



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toolroom and being given a toolmaker's rate, that attitude seems illogical in view of the shortage of toolmakers. They should look at the situation from the angle of "unity" and "one-ness" of the organization, which means that the whole company works as a team from the executive down to the helper. What's good for the welfare of the company is good for the welfare of the workers, including the sacrosanct toolmakers.

There should be no valid objection by the toolmakers against a first-class machinist's promotion to toolmaker when the man has demonstrated his ability as a good all around machinist capable of handling any job on the machine or on the bench. It's "for the birds" to argue that because a man never served an apprenticeship in toolmaking, and no matter how good he is, he can't ever qualify as a toolmaker. Doesn't a lifetime of experience as machinist count for anything? Officially serving an apprenticeship doesn't guarantee the ultimate creation of a craftsman. The hard mill of experience grinds exceedingly fine when it comes to producing a craftsman.

As far as toolmaking is concerned, thirty years ago a toolmaker built tools direct from part prints, using his imagination and experience to decide what kind of tool was needed. Today, he works from tool drawings, but something has happened. During the last decade, because of an acute shortage of skilled labor, we have raised a generation of toolmakers who are so dependent on tool drawings that the majority of them can't do any thinking on their own. The infusion of new blood into the toolroom via promotion of able machinists is a step in the right direction.

After all, when is a toolmaker? This may be answered by the state-

"It still doesn't sound just right!"

New Thompson AUTOMATIC double wheel TRUFORM Grinder speeds jet engine production

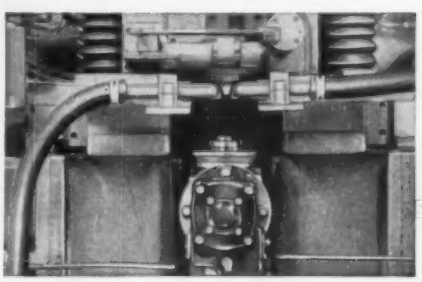
GRINDS BOTH SIDES OF JET TURBINE BUCKETS OR BLADES SIMULTANEOUSLY IN A SINGLE SETTING

To grind root sections on gas turbine buckets with greatest accuracy and productivity, Thompson developed this new AUTOMATIC double wheel TRUFORMING machine featuring simultaneous grinding of both sides of root section with one setting of work.

Grinds rough to finish in 110 seconds . . . or 30 buckets per hour

Hood doors, work clamps, coolant flow, grinding and crushing cycles are actuated in automatic sequence on the new Thompson AUTOMATIC double wheel TRUFORM Grinder.

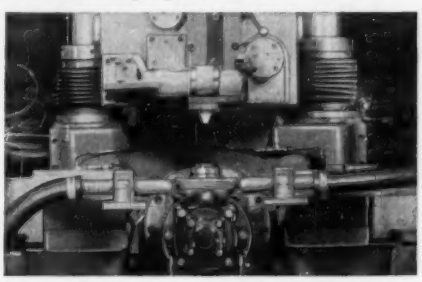
On a bucket having 2" length of form similar in design to the one in the diagram above with .150" stock removal per side from rough to finish size, production is 30 buckets per hour at a steady day after day rate. This includes down time for dressing, regrinding the crusher roll, initial machine warm up period, wheel changing and diamond changing. Actual machine time from rough forging or casting to finish is 104 seconds plus 6 seconds for loading and unloading time . . . makes total time floor to floor 110 seconds per piece.



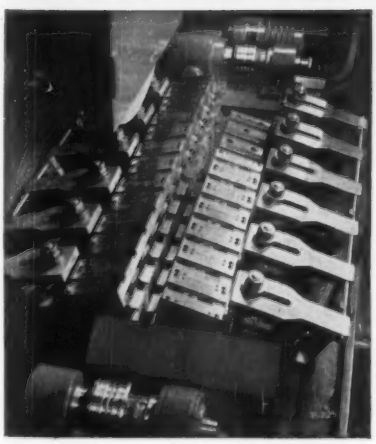
FOR ABSOLUTE SYMMETRY BOTH WHEELS ARE DRESSED FROM A SINGLE CRUSHER ROLL

GRINDING POSITION

CRUSHING POSITION

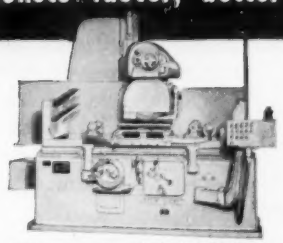


Standard THOMPSON TRUFORM Machines also grind jet buckets faster, better



By means of multiple grinding of jet turbine buckets the standard TRUFORM Grinders still offer high production plus many advantages such as flexibility of standard machine design and lower first cost. Although compared to the new AUTOMATIC the standard TRUFORM requires more skillful set up and tooling.

Typical tooling on Type "C" TRUFORM producing 24 buckets per hour. Type "B" TRUFORM produces 18 parts per hour.



Thompson Type "C" TRUFORM

FOR COMPLETE DETAILS WRITE TODAY

The Thompson Grinder Co.
Springfield, Ohio

Thompson SURFACE Grinders

It isn't KENDEX* unless it's KENNAMETAL*

KENDEX* is the Registered Trade-Mark of Kendex Tools which are made exclusively by Kennametal Inc.

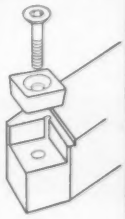
Kendex tools feature a precision-ground, multiple-edge, screw-mounted, indexable Kennametal insert that needs no regrinding. When the insert's multiple cutting edges become dull, to throw it away is economical practice. Replacement cost is slight compared to that of regrinds.

Kendex tooling minimizes downtime for tool changing, eliminates tool grinding expense, and ends the false economy of reconditioning tools that have outlived their usefulness. Ask your nearest Kennametal representative for details. Kennametal Inc., Latrobe, Pa.

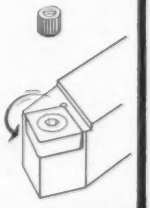
*Registered Trade-Marks

How KENDEX* Works

1 Hard, strong, wear-resistant Kennametal is molded into square, round, or triangular Kendex inserts, which are precision ground.



2 Kendex inserts are mounted to suitable tool holders with socket head screws.

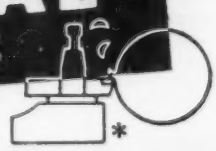


3 When edge becomes dull, insert is turned to new cutting position. When all cutting edges have been used, insert is thrown away; no regrinding.

KENNAMETAL*

CEMENTED CARBIDE TOOLING THAT INCREASES PRODUCTIVITY

SALES OFFICES IN PRINCIPAL CITIES



ment that a competent toolmaker is a highly skilled technician, well-versed in the most difficult machining operations of a metalworking shop. As allied skilled artisans, first-class machinists offer good basic material for filling vacancies in the toolmakers' ranks. Why restrict machinists to their own field when promotions exist in an allied field?

As Shakespeare said:

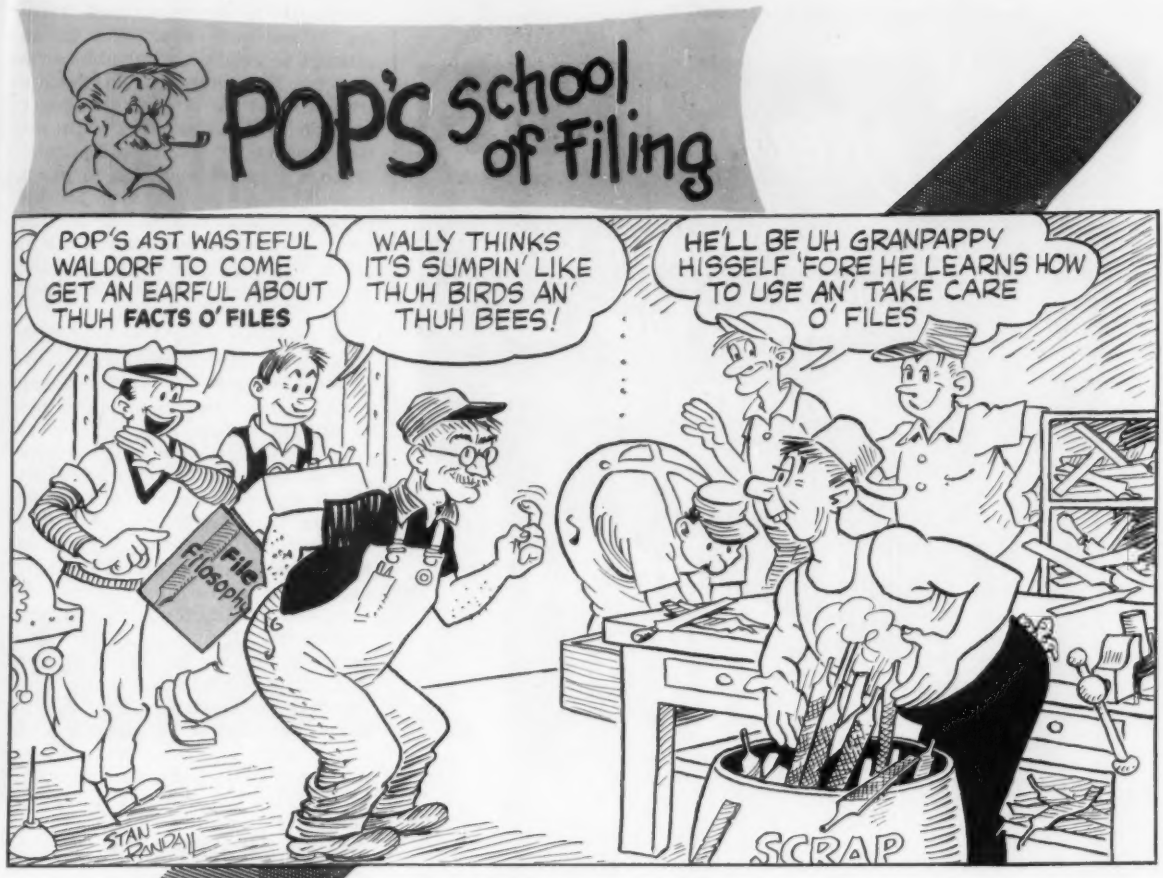
"What's in a name? That which we call a rose
By any other name would smell as sweet."

Labeling a craftsman "toolmaker" does not detract from the importance of his job in an organization. Perhaps the toolmaker cannot be blamed for being justly proud of his title. However, if the designation of "toolmaker" may mean either a highly skilled craftsman, regularly operating without supervision a wide range of machines, and working to close tolerances, or a person who operates only a few tool-shop machines and does so under close supervision, the job title has little consistent meaning. Nevertheless, the toolmaker, in the true sense of the word, is an artisan. As such, he possibly resents the intrusion of a man who has not served a formal apprenticeship but entered the field through the back door of promotion from machinist.

In the case under discussion, Judson surely deserves the toolmaker's rate; being the best all around machinist Al ever had, and having the versatility to perform any job on the machine or on the bench. I think the toolmakers are crowding their luck when they try to raise the barrier of "no formal apprenticeship in toolmaking" as objection to Judson's promotion and state that he can't ever qualify as a toolmaker.

The foreman is to be commended for having the percipiency to effect the promotion of one of his first-rate

"There's no use hinting, Perkins. We are working this weekend."


POP'S school of Filing
POP'S AST WASTEFUL WALDORF TO COME GET AN EARFUL ABOUT THUH FACTS O' FILES
WALLY THINKS IT'S SUMPIN' LIKE THUH BIRDS AN' THUH BEES!
HE'LL BE UH GRANPAPPY HISSELF 'FORE HE LEARNS HOW TO USE AN' TAKE CARE O' FILES
File Filosophy
SCRAP
STAN RANDALL

NICHOLSON U.S.A.

Too many files go to an early grave (scrap barrel) because of incorrect use and lack of care. Nicholson—world's foremost file manufacturer—goes to extraordinary lengths to put extra quality and life into Nicholson and Black Diamond files in order to give industrial concerns an extra measure of filing production. Getting it is well worth keeping workers reminded of these simple rules:

DON'T put too much pressure on forward file stroke.

DON'T drag file back under needless pressure.

DON'T let files become clogged with dirt or filings.

DO "tap" file frequently (on wood) to loosen chips; also clean with file brush or "card."

DON'T throw files on top of one another. (Scuffs, blunts and chips teeth.)

DO keep files separated (in racks).

DON'T let files rust. (Corrodes and dulls teeth.)

DO use *The right file for the job.**

***CONSULT YOUR INDUSTRIAL DISTRIBUTOR.** The variety of Nicholson and Black Diamond files is wide. Designs are frequently distinctive. The importance of careful selection is great. No other file manufacturer has gone more intimately into the solving of industrial filing problems—in relation to different metals, operations and shop practices. We, through Industrial Distributors and our own field services, will help you gladly.

"**FILE FILOSOPHY,**" Nicholson's famous book on the kinds, use and care of files, is FREE for use in "shop schools," tool rooms, production studies, etc. How many copies can you use?

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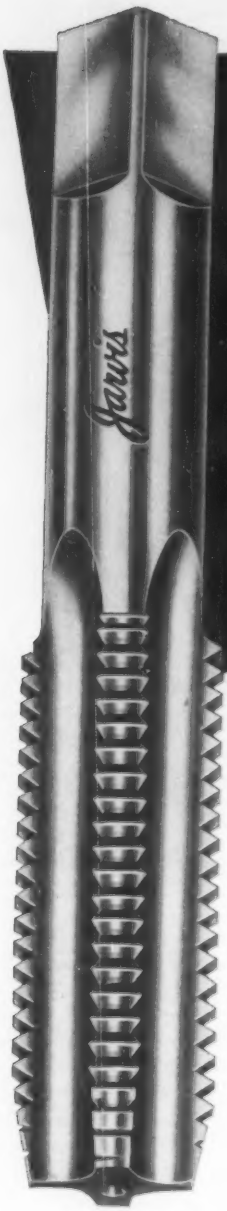
(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

BLACK DIAMOND MADE IN U.S.A.

NICHOLSON . . . A FILE FOR EVERY PURPOSE



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AN INDUSTRIAL TAP FOR INDUSTRIAL USERS

have "Custom Made" Cutting Edges at NO EXTRA CHARGE

"Custom Made" means just that! Accurate indexing and precision machine grinding of flute and spiral points on Jarvis Taps produce a tool in which ALL the cutting edges do their share of the work. Our highly accurate fluting process makes it possible for us to control for your PARTICULAR NEEDS the amount of hook ground in the flutes. Specify Jarvis, and you'll always have "Custom Made" Taps designed to do a specific job superbly well.

JARVIS POWER TOOLS

include:

TAPPING ATTACHMENTS
TAPS · FLEXIBLE SHAFTS AND MACHINES
ROTARY FILES
TUNGSTEN CARBIDE REAMERS AND MILLS
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Send for complete Tap Catalog now—also name of your nearest Jarvis representative.

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

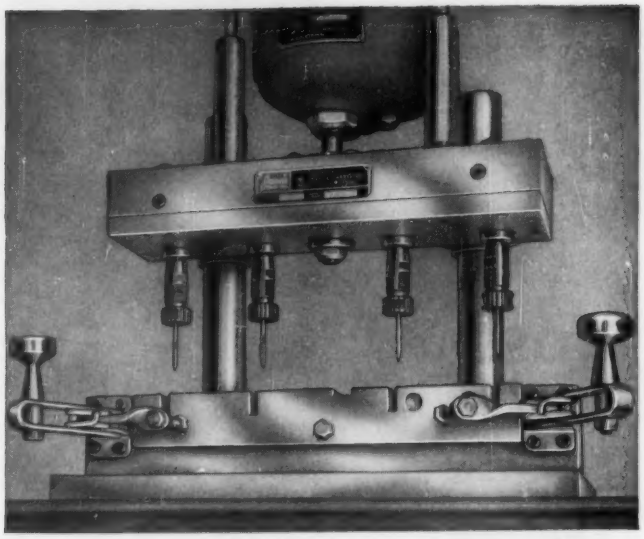
machinists to toolmaker and transfer to another department in an attempt to retain his valuable services for the company. He demonstrated that a dog-in-the-manger attitude is not consistent with the best interests of sound management. When a foreman is unable to pay a top-rate man more money in his present rating, and he is on the verge of quitting, any plan that will aid in retaining the services of the skilled worker is good for the company, foreman, and worker.

No employee should be held back because his supervisor hoards competent manpower. The company comes first; advancement should not be limited because an employee has reached the pay ceiling of his present job in a particular department or the foreman selfishly tries to keep him on his crew. The foreman who endeavors to place one of his good men in another department where opportunity exists for a higher position, and unselfishly puts company loyalty first, is to be lauded for his foresight and consideration of men and management. In doing this thing, the supervisor is helping himself as well as the company and his men. Many a supervisor has been promoted because he demonstrated his ability, not only to build an efficient organization but to develop men who contribute to the upbuilding of the company.

Ambition is a characteristic of people in many nations, but nowhere is it any more developed than in our own country. We have a burning desire to succeed and will exert a great deal of effort if we see a hope of bettering ourselves. In a survey some years ago, 89% of workers questioned replied that "opportunity for advancement" was a major work incentive. This factor

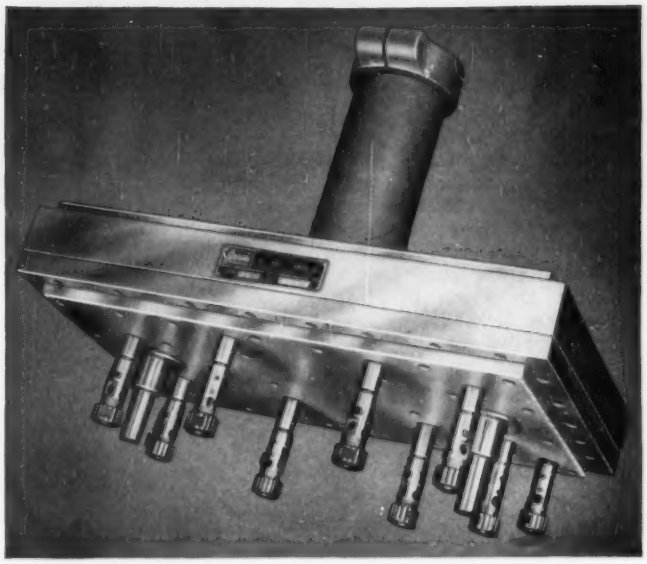
"I dropped in to inquire whether you wanted to use my name in a testimonial."

For Multiple Tapping and Drilling . . .



AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

Jarvis MULTI-TAPPERS



Engineered and built to your specific production requirements from our basic standard components, Jarvis Multi-Tappers can be furnished for any type of drill press available.

We invite your inquiries—let us assist in analyzing your tapping and drilling needs!

Send for our catalog featuring Jarvis Multi-tappers

NEW FEATURES OF JARVIS MULTI-TAPPERS

include:

- Aluminum case—Jig bored.
- Gear driven—positive action, silent drive.
- Ball bearings throughout.

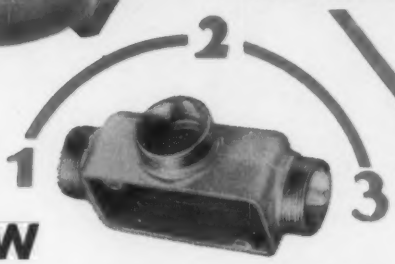
WHEN POWERED WITH A JARVIS TORQOMATIC DRIVE THE JARVIS MULTI-TAPPER PROVIDES THE MOST EFFICIENT AND PRODUCTIVE MACHINE IN THE FIELD.

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

GOSS & DeLEEUW

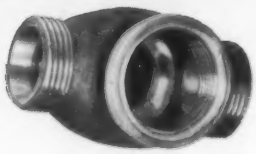
AUTOMATIC CHUCKING MACHINES

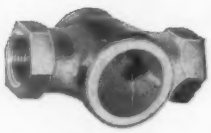
perform one to three operations in sequence or simultaneously . . .



TO CUT PRODUCTION COSTS...

More completely finished parts at the end of the day with no partly finished pieces lying around is the regular accomplishment of Goss & DeLeeuw "1-2-3" chuckers. It means complete finishing on one, two or three ends simultaneously or in sequence without tool resetting, rechucking or parts handling. Machining operations may include boring, facing, turning and threading.





Change over from job to job is simple. Cost-cutting is assured on long or short runs. Goss and DeLeeuw Chucking Machines are the only standard machines of their type which operate the "1-2-3" way to reduce costs per piece and step up the number of pieces per hour.

Investigate the opportunities offered by these machines on your production by sending samples of your work for time and cost estimates—Ask for illustrated descriptive literature.

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QUALITY · PRODUCT · QUANTITY · STOCKHOLM

GOSS and DeLEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A

was in second place, nosed out only by "job security," which led by a 1% margin. It ranked far above such things as "hours of work," "vacations with pay," and "working conditions." Today, opportunity for advancement would probably be placed first among reasons that would make intelligent workers want to work for a particular company. Surely, this desire for advancement should be utilized by a loyal supervisor in aiding his men to secure higher positions for which they are qualified, even at the cost of losing the workers to another department where the better jobs are available.

When employees posses alternate skills, it is much easier to adjust to work-load fluctuations, hereby avoiding layoffs in one group and simultaneous engagements in another. Promotion involving transfers to other departments gives management the opportunity to train employees in a variety of jobs so that force adjustments can be made quickly and satisfactorily in an emergency. Transfers also have much to recommend them as a means of preparing selected employees for promotion. A man who has had experience on a variety of jobs is likely to prove a better and more valuable employee than one whose experience has been limited to a single operation. A versatile employee is more likely to be selected for advancement than his more limited fellow worker.

First things should come first; where the solution for meeting the scarcity of toolmakers lies in promotion of qualified machinists to toolmakers, an exaggerated superiority complex on the part of the toolmakers is inexcusable and should not be tolerated as an excuse for keeping the field closed.

Harry Kaufman
Philadelphia, Pa

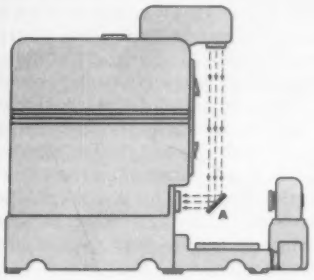
"Joe sure is an enthusiastic salesman of the company's product."

Plain Pointers on Projection

AMONG the definitions listed by Webster for the adjective *universal* is: "adapted or adaptable to all or to various uses, sizes, shapes, et cetera"—a definition we like to feel applies to Kodak Contour Projectors.

Admittedly, we make two projectors, one for routine inspection gaging (the low cost of which might surprise you) and a second for toolroom use affording measurements to "tenths." Optically, however, these two instruments are one. And it's their optical system which makes them truly "universal."

Back in the early days of design, our engineers set out to provide in a single contour projector light sources both for horizontal and for vertical shadow projection. They also developed the unique Kodak Surface Illuminator, a self-contained light source which affords surface projection in either plane. Their reasoning was economic. By combining these features, the instrument could be easily adapted to a wide range of parts; the more uses to which the projector might be put, the sooner it would pay for itself in the shop.



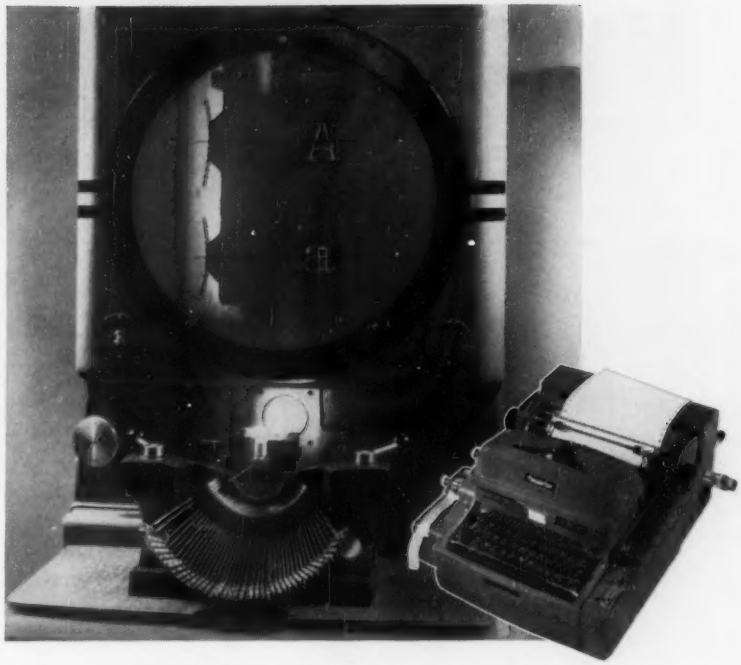
Above drawing illustrates how vertical light source is utilized. With part on a glass staging platform, image is reflected by mirror (A) into optical system of projector.

Nothing has happened since the design stage to shake us in this belief. However, we have been somewhat surprised by some of the highly ingenious ways in which our projectors are used: as in the case of the typewriter fixture (illustrated in our advertisement at the right), where the surface illuminator yields a simultaneous plan and profile view of the type bar face.

Equally ingenious, if not more so, is a device which employs both the horizontal and vertical light beams to simultaneously project the shadow image of a shaft and a reticle scale for gaging its tolerances. A description of this application, which runs to more words than space here affords, is available on request from the Special Products Sales Division, Eastman Kodak Company, Rochester 4, N. Y. Just ask for the folder on the new, universal shaft checking fixture.

Applications such as these have opened the eyes of many engineers to the fact that inspection by optics today has overcome traditional limitations. In the best sense of Webster, contour projection may be "adapted to various uses, sizes, shapes, et cetera." And to the solution of various problems in inspection and precision measurement, including, perhaps, your own.

(Advertisement)



This "3-D picture" showed the way to cut aligning time 25%

What you see here on the Kodak Contour Projector is both the *front* and *side* view of a typewriter type bar—a picture that helped reduce aligning time 25% at Commercial Controls Corp., manufacturers of tape-controlled Flexowriters and Justowriters.

Light reflected from the surface of the type character provides an image for rapidly checking horizontal and vertical alignment of the letter. Simultaneously, mirrors in the special holding fixture project a profile image of the type—yield an accurate check of the desired position of the letter as it will contact the platen. Only the Kodak Contour Projector's unique surface illuminator makes possible this combined plan and profile view.

Alignment of type is a critical factor on these automatic machines which type at 100 words a minute and must produce copy for printing reproduction. Until recently, Commercial Controls had to perform this inspection operation during final assembly. Now, this new gaging technique has made it possible to inspect the type bars immediately after their removal from the soldering jigs. Each bar is quickly moved into place and compared with the tolerance lines of the chart-gage on the screen. Alignment of letters is held to a tolerance of $\pm .0002''$, contact to $\pm .0015''$. And, by catching errors at this point, aligning time has been cut 25%.

Perhaps the speed, precision, and economy of optical gaging can help you solve a difficult inspection or measurement problem. There is a field representative in your area who will be glad to discuss your problem with you. You can get in touch with him or obtain a copy of the booklet, "The Kodak Contour Projector," by writing to:

Special Products Sales Division
EASTMAN KODAK COMPANY
Rochester 4, N. Y.

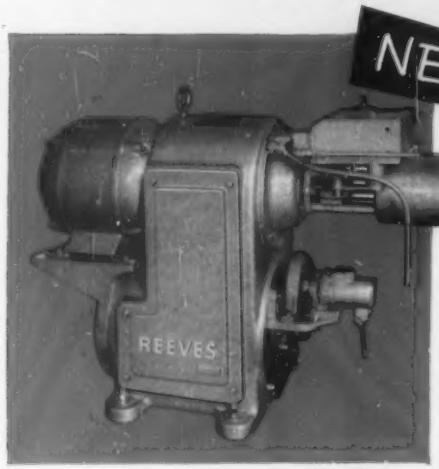
the KODAK CONTOUR PROJECTOR

Optical Gaging

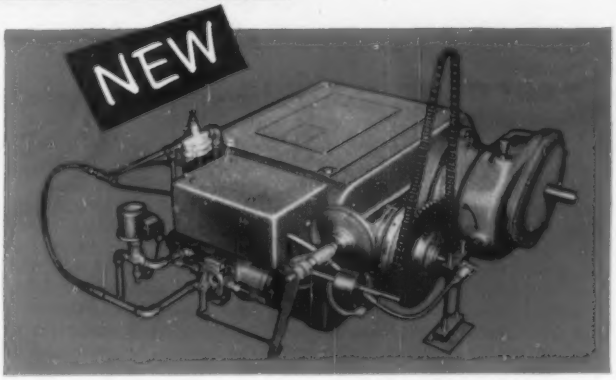
A new sound movie, Optical Gaging, shows how to simplify complex inspection problems. We'll tell you how to get it for a showing.

Kodak
TRADE-MARK

You're automatically right with REEVES*



CONOFLOW—for automatically controlling liquid levels in tanks, maintaining constant temperatures, pressure and other variables, and monitoring flow systems of liquids, gases or chemicals with linear output speeds.



AUTO-TENS—for automatically controlling tension on web-type materials without floating roll, compensating roll, follower roll or other complex mechanisms.

* REEVES' complete line of variable speed drives *and eight automatic controls* assure you the right combination to operate your machines more efficiently, more profitably, *automatically!* Regardless of your production problems—controlling tension, acceleration or deceleration, velocity and peripheral speed—synchronizing one or more machines—or maintaining uniform temperature, pressure, liquid level or liquid flow—REEVES has the solution to automatic production in your plant. Write today for the most complete booklet published on Automatic Production Control—with application photos, schematic drawings and actual solutions to production control problems. Specify Dept. A1-G.

REEVES PULLEY COMPANY · COLUMBUS, INDIANA

HOTSHOT FATHEAD

Is there any solution to the problem of trying to maintain peace in the department if you have a first-class machinist who won't keep that fact to himself? Is it better to fire the man, or try to point out to him that his arrogance infuriates everyone else?

THIS PROBLEM, like all others, was once a small one and that is when a sharp foreman would take care of it. Now, for whatever reason, it is a big problem and, because we are dealing with the personality makeup of a human being, it is one of the most complex. There is no formula which will serve, and it is probably well that there is not, but there are undoubtedly many good plans of procedure which probably all culminate with firing the workman, if his actions cannot be corrected.

In personality matters there are too many qualifying aspects to outline any one plan that should be followed. To assume the first qualification, if the foreman is one who deals more with people than with things, then he should have formulated these various plans of action through his past experience. The workman in question is worth trying to save; he has the ability of "good workmanship." If the foreman can correct and save the situation, he is a good foreman. He must realize, however, that although he may listen to vague suggestions which will help him formulate his own idea on how to proceed, there is not a single person in this world who, without knowing the complete situation and the people involved, could tell him exactly what to do.

A foreman who deals with things more than people, and cannot get the proper assistance, can only gamble by taking the workman aside, looking him straight in the eye and saying, "Brother, conform or else."

Sheldon Meyers
Bethpage, NY

AS THEY SAY IN SCOTLAND, "A man should have a good conceit of himself," but when conceit is carried to the extreme and the fellow with the well-nourished ego goes from the irritating to the obnoxious, I am inclined to the belief it is time for drastic action.

What form the action should take, of course, depends on how far the malady has progressed. I have seen cures effected where the boys in the shop simply ignored the afflicted individual. When he started to air his inflated opinion of himself at lunch

time, or wherever he had a chance to get a hearing, the conversation was pointedly switched to another subject. If he didn't take the hint, he suddenly found himself without an audience. And the braggart without an audience is lost.

If the silent treatment didn't effect a cure, and this pest inflicted himself on his neighbors during working hours, I have seen instances where more drastic methods prevailed. While the blow-hard was sounding off in someone's ear, tools would mysteriously disappear from his workplace, or necessary parts from his machine, which meant he had to pay more strict attention to business, and give the other fellow's eardrums a rest.

If he went to the toolcrib for tools, the attendant would usually have business that compelled his attention elsewhere. Which meant he had to cool his heels longer than necessary and scramble back to his machine and really perform the feats of high production he bragged about. All very unethical, of course, and not a practice condoned by efficient management, but I have seen foremen overlook these departures from the normal routine and feign complete ignorance of their having existed. If this did not bring the erring one to his senses and cut him down to size, and it usually did, he quit in disgust.

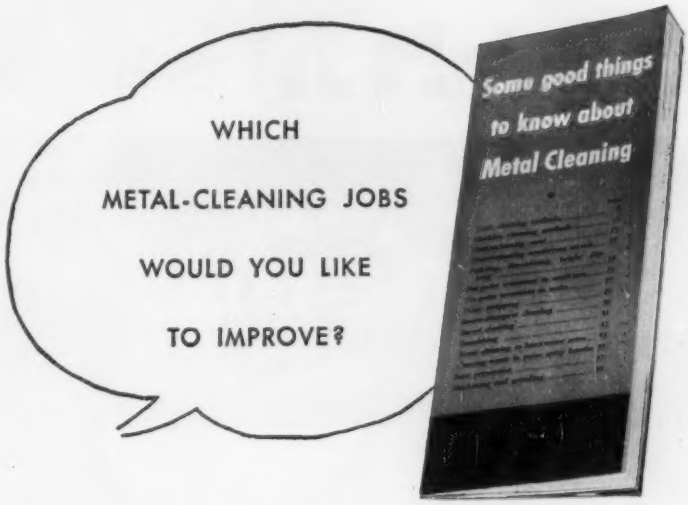
I think the moral is, keep such an individual with his nose to the grindstone so that he will have no time to bother other people with his delusions of superiority.

If he is such a hopeless case as Smith seems to be, and the shop morale is suffering, then good man or not, a termination slip in his pay envelope is the only solution.

If you have a contented group of individuals who don't profess to be touched with genius, the loss of one prima donna will soon be made up so far as productivity is concerned.

Robert S Alexander
Greenville, RI

"Once when I was but a callow youth a man betrayed my trust."



Listed below are some of the operations discussed in Oakite's 44-page handsomely illustrated booklet on Metal Cleaning. Please check the list. Then let us show you how Oakite methods can give you better production with greater economy.

Technical Service Representatives in Principal Cities of U. S. and Canada

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

OAKITE PRODUCTS, INC.
24 Rector St., New York 6, N. Y.

Tell me about Oakite methods and materials for the following jobs:

- ☐ Tank cleaning
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- ☐ Steam-detergent cleaning
- ☐ Barrel cleaning
- ☐ Burnishing
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- ☐ ALSO send me a FREE copy of your booklet *"Some good things to know about Metal Cleaning".*

Name _____

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now!... and

Copper Plated

Certified
BRAD FOOTE GEARS

Here is a way for you to be sure that you are getting gears that—**1**) meet or beat AGMA requirements; **2**) are made according to an exclusive BRAD FOOTE formula which provides long, trouble-free service; and **3**) reduce final costs. You simply specify "*Certified* BRAD FOOTE Gears"...and here's what you get—

Manufacturing

Certified BRAD FOOTE Gears are made to your order...from your specifications...or from specifications we develop for you. Every operation, from machining through heat treating, on every gear, gearmotor, reducer, or transmission is done in our own shops and carefully controlled by BRAD FOOTE engineers.

Testing of *Certified* BRAD FOOTE Gears is done with modern hardness testers, Magnaflux, Metallograph, Shadograph, and numerous micro-gauges. That's why we can say "*No one shares our responsibility.*"

Copper Plating

You get three distinct advantages from the copper plating* of *Certified* BRAD FOOTE Gears. The copper plating prevents corrosion. It eliminates messy, dirt-catching greases. It permits gears to be kept on hand indefinitely without ill-effects.

Another thing, the thin copper plating acts as a lapping compound which lets the gears run in smoothly and quickly. You do not have to remove it from teeth or bearing surfaces.

And, copper plating is your positive identification of *Certified* BRAD FOOTE gears. It's your guarantee of quality. It's your assurance that the gears you bought have long-wearing teeth and bearing areas, and tough cores that will give you service equal to or better than that of any other gears made.

Certificate

Furnished with every order of *Certified* BRAD FOOTE Gears and assemblies is a Certificate bearing our order number and signed by BRAD FOOTE'S Product Certification Manager. It certifies strict adherence to specifications and the formula applying to *Certified* BRAD FOOTE Gears. You can't buy better gears.... *Yet...you pay no more.*

Write today for descriptive literature

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1309 South Cicero Avenue • Cicero 50, Illinois
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BRAD FOOTE
PRODUCTS

*Gears over 30" diameter
are protected by copper-colored
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before placing in service

Certificate

This is to certify that:

1. The products furnished on BRAD FOOTE order number 1854, readily identified by their corrosion-preventive copper plating,* were made according to an exclusive BRAD FOOTE formula which controlled every step in the manufacturing process.
2. Only the finest quality metal for the particular service in which the products will be placed was used.
3. All machining specifications, where necessary, were held to extremely close tolerances.
4. Heat-treating of ferrous metals was carefully controlled by skilled workers using modern equipment.
5. Original specifications were adhered to and every operation was rigidly inspected.
6. All hardness specifications of teeth, cores, bearing areas, etc., were accurately tested on modern Rockwell or Brinnell hardness testers.
7. All standards of the American Gear Manufacturers' Association (AGMA) were met or bettered.
8. These BRAD FOOTE *Certified* Products were made to give service that is equal to or better than you might receive from any other similar products in equal service.

*Products over 30" diameter are protected by copper-colored water-soluble paint which need not be removed before placing in service.
Plating and painting are not applicable to internal parts of assemblies.

Date 10-20-53

BRAD FOOTE PRODUCTS

Richard [illegible] Manager
Product Certification

BRAD FOOTE GEAR WORKS, INC.
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COST CUTTING MACHINES

• POWER PRESSES

OBI Presses, standard and deep throat; 15 floor and bench models; 3 to 18-ton capacities.

ARBOR PRESSES •

In 32 stock plain lever, simple ratchet, combination compound. Bench and floor types deliver up to 15 tons pressure.

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Wet and dry models. Capacity up to 6" round and 6" x 12" rectangular stock.

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28 Models, ½ to 3¾-ton capacity with electric or air controls, bench and floor types.

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Complete line of 15" single and multiple spindle models, bench and floor types.

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In 10 bench and floor models. Sturdy, semi-steel construction. Deliver up to 3¾ tons pressure.

• SQUARING SHEARS

In 8 power, 6 foot and 4 air models. Cutting widths 22" to 72". Capacity up to 14 gauge mild steel.

Famco Cost-Cutting Machines are available at your dealers. Free catalogs sent upon request.

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FOOT PRESSES • POWER PRESSES • SQUARING SHEARS

AIR PRESSES • ARBOR PRESSES • BAND SAWS • DRILL PRESSES

THE HOTSHOT FATHEAD is one whose desire to be appreciated is defeated by his know-it-all attitude. He is a hotshot because he has the ability and the determination to do his work better than anyone else. This is an indication of a desire to be important, to be appreciated, to be a leader. He is a fathead because he is impatient. He cannot wait for appreciation. He cannot wait to be elected a leader. He asks for appreciation by calling attention to himself, by showing off, by belittling others, by throwing his weight around.

The hotshot fathead is a problem in the shop. He has qualities which are desirable in a worker and characteristics for which he should be discharged. He can do good work, the kind of work which an enterpriser needs to be a successful competitor, but he is not an agreeable person to work with. Thus we recognize our problem. We believe it is worth solving because the hotshot is an economic asset. The fathead can be corrected by simple psychology and education.

Having recognized our problem we must analyze it. The good work habits of the hotshot indicate that he wants to be recognized as a leader. His antics in the shop indicate that he does not know how to attain leadership. Leadership is an elective office. The hotshot would not get two votes for dogcatcher; yet it would be normal for all skilled workers to

"Starting now you'll be the new foreman."

admire the finesse of the hotshot as a workman. Thus, we have some good material on which to start our education.

We shall explain some of the qualities of leadership to the hotshot. We shall encourage him to develop such qualities in himself until they become part of his character and personality. We shall urge the hotshot to seek leadership on the following platform:

1. Be sensitive to the pride and feelings of others.
2. Be a better listener than a talker.
3. Don't worry or be envious of another's success.
4. Sell others, not yourself.
5. Be agreeable and encouraging to others.
6. Be even-tempered and friendly.
7. Don't be concerned with trifles.
8. Be guided by both logic and intuition.
9. Do not be emotional or a grudebearer.
10. Suggest rather than demand.

The hotshot fathead can be salvaged as a man and as a valuable employee. The solution is education, not objective discipline. We must avoid breaking the hotshot's spirit. He is a competitor. As he strives for leadership we must encourage him. It is a long and difficult task to change one's habits of conduct. However, good work habits are a solid foundation on which to build character. When the hotshot ceases to be a fathead, we have recreated a man. We have accepted a challenge and solved a problem. We can admire our new leader and feel proud of ourselves.

Peter A Seward
West Lynn, Mass

•

PORTIONING OUT THE PIE

How can one worker be paid more than the other men if he is doing additional jobs for the foreman? Is a shop-wide job evaluation system the solution to this problem?

DESPITE ALL THE VARIOUS SCHEMES which have been evolved for paying a man rates which are worthy of his hire, discontent cannot be avoided. There comes a time when management gets tired of leaning over backwards in trying to please everybody, lays down a set of firm rules of payment and tells those who do not like it to take it or leave it. Very often, this firm stand on the part of management has the desired effect by weeding out the chronic grumblers who contaminate the rest of

an ACCO product

ENDWELDUR SLING CHAINS

Small AMERICAN Sling Chain Lifts 25,000-lb Load Safely

• This ACCO *Registered* 4-leg, Endweldur 125 Sling Chain is relatively light in weight yet it has sufficient strength to lift an expensive 25,000-lb die with safety.

This desirable combination of great strength and light weight is the result of scientific heat-treatment of the alloy steel used in this modern chain and the proper combination of engineered hooks and pear shaped links that make up a complete ACCO *Registered* Sling Chain assembly. This gives you a chain that is easy to handle and safe to use even where working temperatures run up to 1000°F.

Endweldur 125 ACCALLOY Sling Chains come in sizes from ¼" to 1¼" with working load limits to 57,500 lbs per leg, so there is a size for just about every lift you have. Other AMERICAN Sling Chains are available in Endweldur 85 made of carbon steel, heat-treated . . . also stainless steel, monel metal and silicon bronze . . . and wrought iron.

AMERICAN has a sling chain for your every need. See your distributor or write our York, Pa. office today for the ACCO Registered Sling Chain Catalog.

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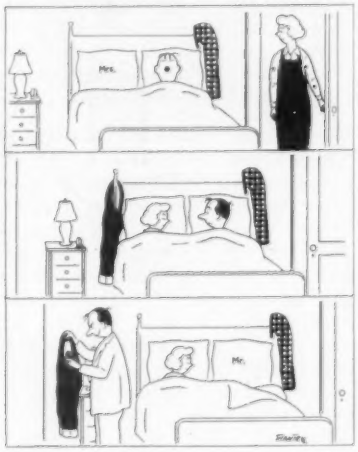
the labor force and a state of reasonable harmony prevails.

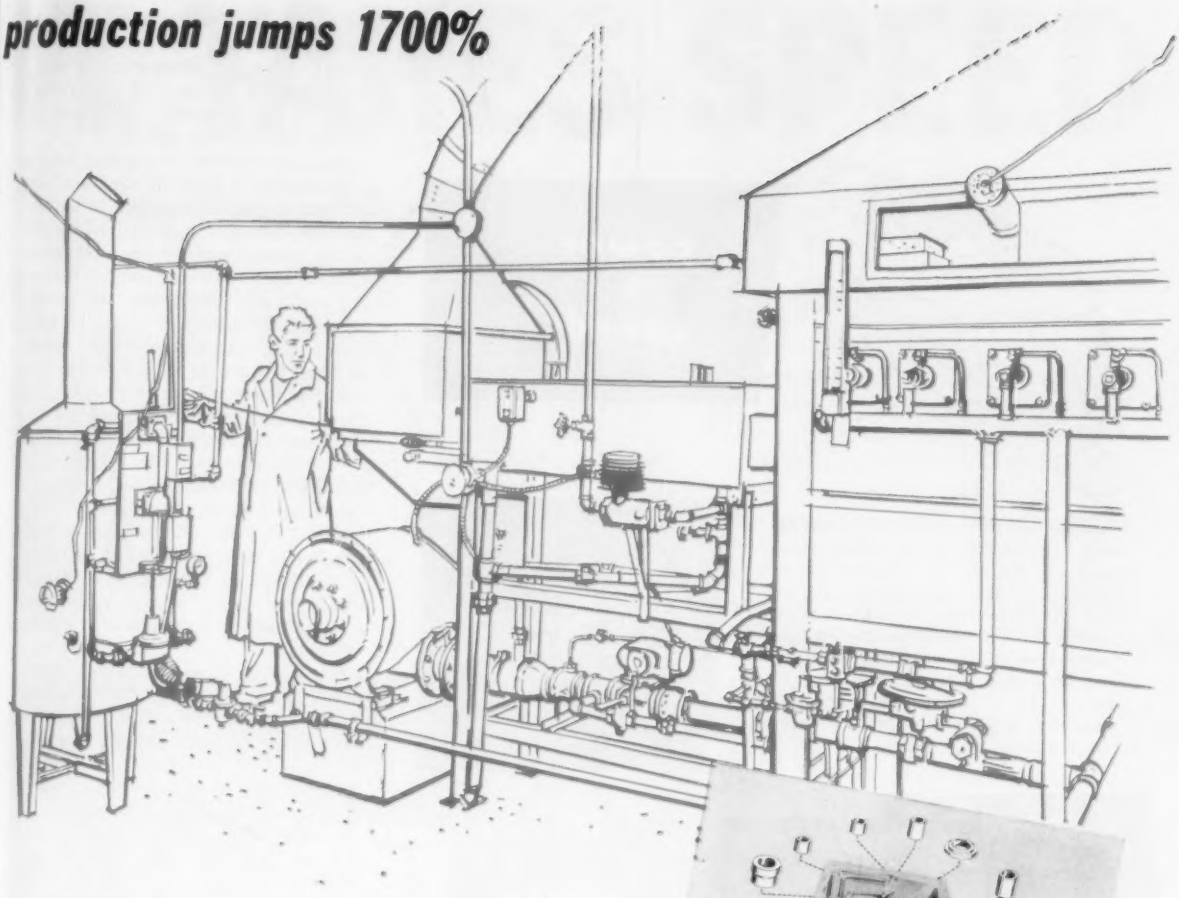
In Britain it has been found, to the surprise of all concerned that money was not the over-riding reason why people stayed with the one firm in a fairly tranquil state of mind. Heating, lighting, morning and afternoon tea breaks, social activities, canteen facilities and proximity of the plant to the workers' homes, together with a good transport service have proved to be greater attractions than the rate of pay.

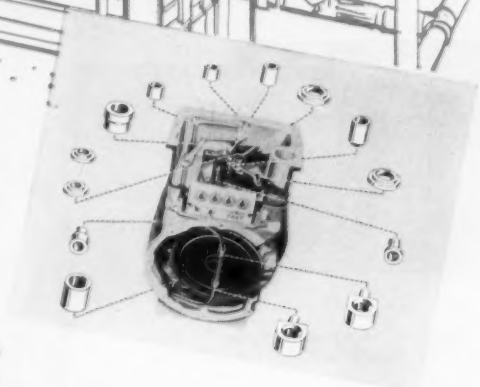
This is borne out by the peculiar situation prevailing in the city of Birmingham, England, where large automobile plants and machine tool manufacturers are packed into a confined space. The automobile plants pay considerably higher rates for skilled men than do the machine tool makers yet both industries keep going. It would not be fair to say that the machine tool makers get all the labor they need and of the right type, but they do stay in production and many of them make an annual award of a gold watch to employees who have completed 25 years' service. The number of watches awarded increases year by year.

A job evaluation system which ought to be prevented by law is that prevailing in many small shops which are owned by a family or one individual. Such shops are dens of intrigue because the rate of pay for each individual is decided in a dictatorial manner by the owner. In order to make the system work without causing acute discontent, each employee is sworn to secrecy and must not discuss his rate of pay with other persons. If a person is on cordial relations with the boss all the other workers think that he is trying to extract more money. It is a pernicious system and often new labor is recruited at a higher rate of pay than that given to some of the



production jumps 1700%





in 'powder room' for metal

When the American Meter Company started sintering precision parts for their meters, their production curve shot up like a scared rocket. For example, they formerly machined one of the bushings, with a production rate of 230 pieces per hour. The same part, of sintered bronze powder, is now turned out at a rate of 4,000 per hour! That's an increase of 1700%!

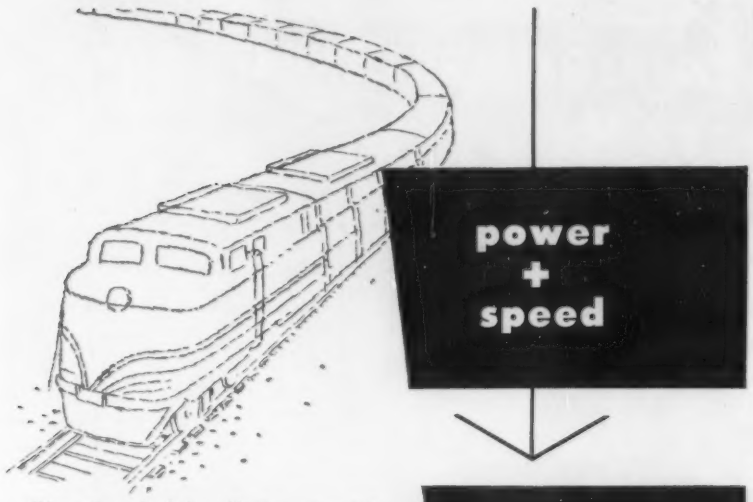
Meter buyers benefit from the changeover, too. Sintered parts improve meter operation: self-lubricating, they reduce friction loss that upsets accuracy, eliminate the necessity of continual maintenance.

Heart of the sintering process at American Meter is a Surface Combustion gas-fired muffle furnace with cooling chamber. Sintering of the metal powder (90% copper, 10% tin) is done at 155°F. A 'Surface' automatic MAX generator provides a furnace atmosphere which protects the parts from deterioration. This equipment is also used to anneal steel and brass parts when production time is available. Surface Combustion will be glad to help you examine the possibilities of powder metallurgy. Write for Literature Group H53-9.

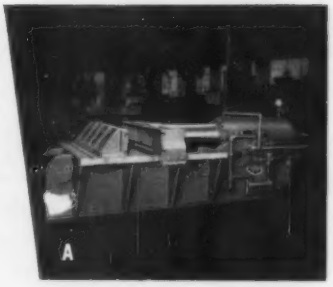
Surface
HEAT TREATING EQUIPMENT

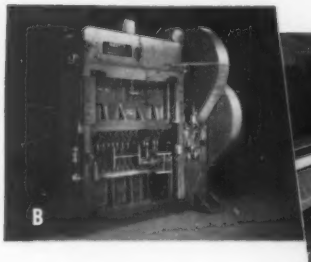
SURFACE COMBUSTION CORPORATION • TOLEDO 1, OHIO

ALSO MAKERS OF
Kathabar HUMIDITY CONDITIONING Janitrol AUTOMATIC SPACE HEATING



When the schedule calls for prompt delivery of goods, the diesel engineer can "pour on the oil" for reserve power. BEATTY metal fabricating machines have this same type of built-in power reserve for industrial production purposes. One of the machines illustrated can be modified to fit your particular needs. Or, if you prefer, call in our engineers to design and build a machine to your exact requirements.





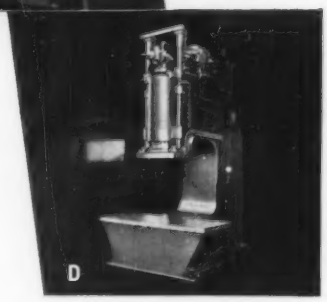
A. BEATTY Horizontal Hydraulic Bull dozer for heavy forming, flanging and bending.

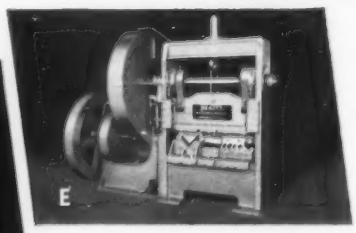
B. BEATTY Guillotine Beam Punch. Punches webs and flanges in "I" beams from 6 to 30 inches.

C. BEATTY Spacing Table handles web and flange punching without roll adjustment.

D. BEATTY Gap Type Press for forming, bending, flanging, pressing. Capacity 250 tons.

E. BEATTY Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.





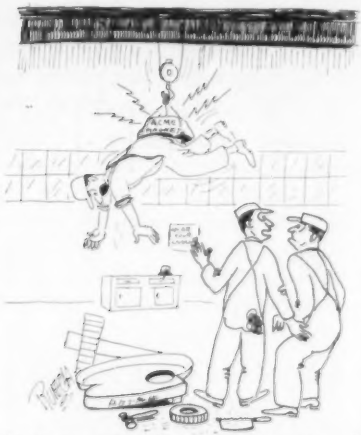
BEATTY
MACHINE & MFG. CO.
HAMMOND, INDIANA

old hands. It is nearly impossible to impose the rule of silence about wages, although it does work in some British shops because of the reluctance of the average individual to discuss his private affairs.

Another method of paying which is practiced in firms of medium size and which are not engaged in a competitive industry is to stick rigidly to the wage rates which have been agreed upon between trade unions and employers. Such shops are peaceful places in which to work. In fact, they are so peaceful that the workers find it hard to stay awake. The new employee who tries to put up a good performance is warned by the old hands that he will not be popular if he undermines the established times for the job. The new man can either slow down and maintain the deadly condition of mediocre output which has been established or, if he is ambitious and energetic, he leaves and takes up a job with a firm operating some form of incentive scheme.

So far, the most successful incentive scheme which we have evolved in Britain is the straightforward piecework system giving payment by results. The method of reward varies. Time made over the basic time for the job is paid to the employee at basic time rates. Others pay the man two thirds of the time gained.

For compensating the man who has to exercise skill or responsibility above average in order to do his work, job evaluation is the only answer. If the points allocated when evaluating are given fairly, there should be no need for discontent, provided that every one in the shop is informed fully as to the method of allocating the points and their value in terms of money. If secrecy about the system is maintained the method of paying comes into the



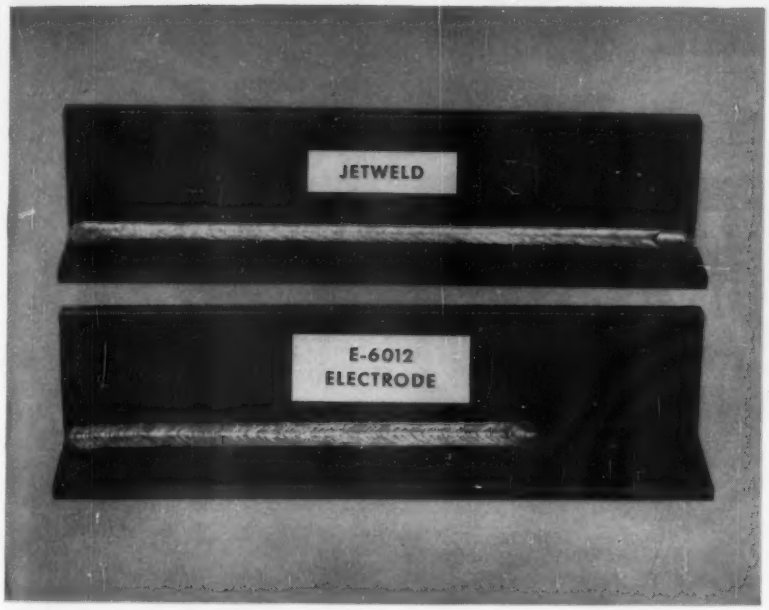
"Joe's been taking those iron shots again . . ."

IT TAKES SPEED

to *really* cut welding costs

HERE ARE THE FACTS! 86¢ out of every welding dollar goes for labor and overhead. Obviously, the most effective way to cut welding costs is to boost welding speeds. This is exactly what you accomplish by using the *right* Lincoln electrode for your welding job. Each Lincoln electrode is designed to do a *specific type of job* . . . do it faster because Lincoln has higher *useable* melt-off rates to give more footage than possible with other makes. This actual test proves the *extra speed* you get with Lincoln electrodes.

TEST OBJECTIVE: To compare the welding speed of Jetweld with the best other make E-6012 electrode in horizontal fillets.



	LINCOLN JETWELD	THE FASTEST E-6012 ELECTRODE
PLATE SIZE	⅜"	⅜"
FILLET SIZE GAUGE	¼"	¼"
ELECTRODE SIZE	3/16"	¼"
CURRENT AMPS.	275 AC	350 AC
ARC SPEED INCHES PER MINUTE	15.0	11.0
DEPOSITION RATE—POUNDS PER MINUTE	.140	.135

LINCOLN JETWELD IS 36% *FASTER* IN THIS SPECIFIC APPLICATION

INVESTIGATE WHICH COST-CUTTING COMBINATION OF THESE LINCOLN ELECTRODES IS BEST FOR YOU

- For flat and horizontal fillets—high-speed, self-cleaning, submerged-arc-like appearance . . . *JETWELD.*
- For welds having poor fit-up. All positions—E-6012 . . . *FLEETWELD 7.*
- Soft arc action, easy-cleaning welds. All positions —E-6013 . . . *FLEETWELD 47.*
- High-speed production welding of lap and fillet welds. E-6012 . . . *FLEETWELD 72.*
- For deep penetration, structural and pipe welding butt and fillet welds in flat, vertical, and overhead positions . . . *FLEETWELD 5.*

GET THE FACTS. *Speeds and procedures for mild steel electrodes are in Bulletin 462, available by writing on your letterhead.*

THE LINCOLN ELECTRIC COMPANY
DEPT. 2010, CLEVELAND 17, OHIO
THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

"I see you two girls got your jerseys mixed again."

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That's why we can make 'em for you quicker and cheaper. *So send us your specs. or prints.*

Note: We cannot make broaches longer than 36" or with cutting sections exceeding 20"; nor round, spline, rifling or irregular shaped broaches, nor square broaches less than ¼" across flats.

The du MONT CORPORATION, Greenfield, Mass.

same category as that operated by the small shop owner.

Where a man has extra duties demanding skill or experience, such as the training of apprentices, one very simple move is to put him on the staff as a salaried worker and take him off the time clock. His welfare should be safeguarded by fixing a limit to the amount of extra time he is expected to work in any week without extra pay. It is better to work out a basic hourly rate for overtime rather than to expect him to work any amount of time free of charge because he is salaried and therefore paid for sickness and time off. This system is very good for small firms which do not operate incentive schemes since it involves no extra staff to administer it.

The job evaluation system has the normal weakness of most job rating methods; it relies ultimately on the judgment of an individual—he allocates the points.

There is one way for managements to look at the various jobs performed by employees and that is to assume that while the man is in the plant he is putting forth average effort in the execution of his tasks. While he is looking after apprentices he is not doing anything else, therefore, he is putting average effort into his job. The idea is that one man cannot do two men's work, therefore, a day's work is 8 hours of average effort and the man is therefore entitled only to average pay. This is a difficult bit of reasoning to put across to a worker but it is one way of looking at the whole problem of how much to pay.

Clifford T Bower
London, England

•

BACKWARD FOREMAN

Must a foreman be able to run all the machines in his department? Can he keep the respect of the men if his knowledge is more along leadership lines than practical experience?

WHEN IT COMES TO a foreman for a machine shop I think Al is right; the man in charge should be well acquainted with the machines of the trade. On the other hand, if it involves a foreman for a manufacturing department, it's a horse of a different color.

I remember two cases in point. One was a job in a specialized department where the man in charge died. The company put in a man who knew practically nothing about machines as he had been the timekeeper and clerk under the old foreman. This man took over and did an excellent

job with the help of an assistant supplied from the machine division. The other assignment was a draftsman who took over a grinding department and made good.

If a man has the ability to get along with help and can get out production, he will probably learn to master the technique of the operation of the various machines and appliances in short order.

Management is generally looking for men with mechanical training to act as foremen—if they also have the necessary qualifications of leadership. In some cases men are available with outstanding qualifications of leadership, but with little or no practical mechanical experience. Many of the latter are chosen and make good foremen.

Management's trend is towards college graduates who have taken up the fundamentals of management; if they also have personality, they are good timber for supervisory jobs.

William C Betz
New Britain, Conn

MANY OF OUR MOST SUCCESSFUL business men did not know anything about the product they manufacture at the time they started. They did, however, have the ability to organize and gather around them the men who did know.

The owner of a business must not only select the men to solve technical problems, but also those who can solve human problems. Knowing how to run all the machines does not necessarily mean a man is foreman caliber. Neither does the fact that he knows the employees better, although it might help if we have the other qualifications.

Let's take a look at some of the other qualifications. In my opinion the most important is learning to be a leader, not a driver or enforcer. Under a leader men work because they want to, but under the driver

"I just hate Mondays. Don't you, boss?"

Production More Than Doubled

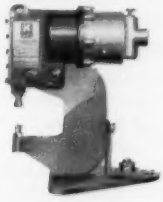
by changing to a

KELLER RIVETER

An electronic tube manufacturer boosted production from 62 to 155 pieces an hour by installing a Keller Compression Riveter in place of a kick press for staking the pins in vacuum tube bases. This 150% increase, achieved at relatively small cost, is typical of the results obtained by proper application of Keller Pneumatic Tools.

For riveting, staking, crimping, pressing, and marking operations, and for forcing fragile parts into a pressure fit, Keller Compression Riveters have the tremendous advantages characteristic of air power. They give a squeeze—not a slap—and exert maximum power only at the *end* of the stroke. This reduces shock and spoilage from cracked and broken parts.

Facts in Brief
about
KELLER Compression Riveters



- Air pressure gives a squeeze—not a slap
- Can be operated by foot valve or hand throttle
- Automatic cycle, stops at end of each cycle
- Portable, bench, or pedestal mounting
- Ideal for pressing, dimpling, staking, forcing, or riveting operations

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GRAND HAVEN, MICHIGAN

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Holes in cutting heads accommodate eleven different round stock sizes. Also special heads for cutting square, and other shaped bars.

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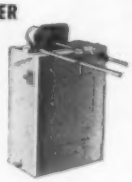

Instantaneous cutting action with Di-Acro Power Rod Parter. Rate of production is limited only by speed with which stock can be fed. Motor driven flywheel, other moving parts housed in welded, steel cabinet.

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they work because they have to. We all work better when we want to. By creating the desire in the employees to work we get a better quality product.

The new foreman must be loyal, cost-conscious, and determined to get along with others. This calls for cooperation up and down as well as sideways. Most foremen do not have any trouble getting along with management and employees; it is sideways cooperation with other department heads that bothers us most. We must have the ability to understand the part the other fellow plays in the organization. This requires friendliness, confidence, courage, goodwill, appreciation, and competence. A good thing to remember is when you build up the other fellow you build up yourself.

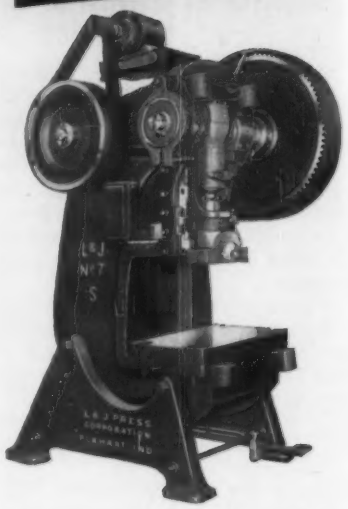
In this case Gibson was chosen for the job of foreman in a department, but he does not know how to operate the machines. He was picked for this job because of other desirable qualifications. He is also a skilled man in an allied line of work. Gibson seems to have a creative mind, and it is not only possible, but quite probable, that he will succeed in this new position. With a firm determination to learn all there is to learn about the machines, he seems to have all the other good traits.

A E Salmons
Philadelphia, Pa

WHO IS TO KNOW if the foreman can't handle the machines in his department? Does he have to pass a test in order to qualify that he is the man for the job, or is he hired to take charge of the department?

It isn't the foreman's business to run machines; his duty is to supervise. Supervision doesn't require that the head of a department be acquainted with every little detail in the shop. He has broader fields to cover. He comes on the job as a master of men, with an understanding of the principles of psychology sufficient to enable him to get the most work out of the men. I'll admit

Improved* L&J PRESSES *Better-Built for Better Work



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ROTOR PENCIL AIR GRINDER

40,000 R.P.M.

POWERFUL!

Only 13 ounces

Handy

Rugged–Steel

SPECIFICATIONS

WEIGHT	13 ounces
LENGTH	5 3/4"
DIAMETER	1"
FREE SPEED	40,000 R.P.M.
COLLET	1/8" or 1/4"

Equipment (Standard)

8 ft. hose and air strainer. Push throttle. Collet wrench. 1/4" collet.

Equipment (Optional)

1/8" collet chuck

Steel rear head. 1/8" air inlet.

Steel rear head. (right angle). 1/4" inlet.

Tool post holder (extra cost).

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from your PUNCH PRESSES

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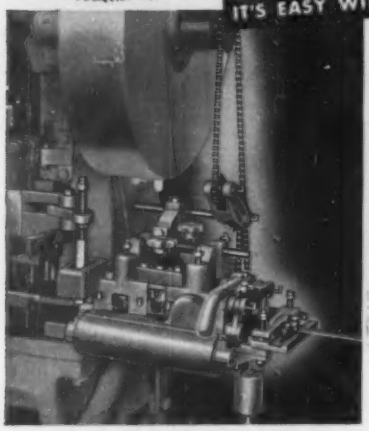

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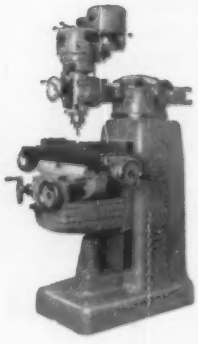

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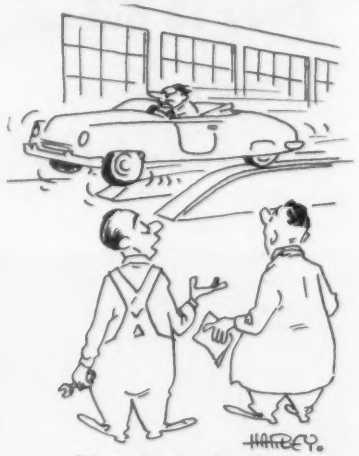
that it would be of help to him to be pretty well acquainted with the workings of the various machines so as to be able to direct the proper procedure in the event of a breakdown, but even that is not an absolute necessity for him to qualify.

The foreman doesn't need to advertise the fact—if such is the case—that he doesn't know how to run certain machines yet. If he is worth his salt, he will keep his eyes open, and his mouth shut, and learn a few wrinkles vicariously. My old dad gave his sons some pretty sound advice along this line when he seriously admonished, "Keep your bloody eye open for business; keep your eyes and ears open and your mouth shut and you'll soon get in the know."

The primary requisite of a supervisor is to see that the workers get the work out—not to be a demonstrator to show off his skill. While he is so occupied with supervision he has no time to be running a lathe or any other machine.

Some men think that it is necessary to get their hands in and operate some of the machines in their department, thinking all the while that they are helping out with production, whereas they are only thwarting their purpose. While a foreman is busy on some machine you can bank on it that three or four of the men, who always need watching, are piddling away their valuable time behind the planer spinning yarns or discussing some smart play in a recent game.

The foreman can't be in two places at once, but he can choose the vantage point so as to observe what is going on around the shop. I feel that Al is stretching a point when he says that the foreman hardly knows the difference between a lathe and a milling machine. If such were the case, I certainly would agree with him that something was rotten in



"He used to be a jet pilot."

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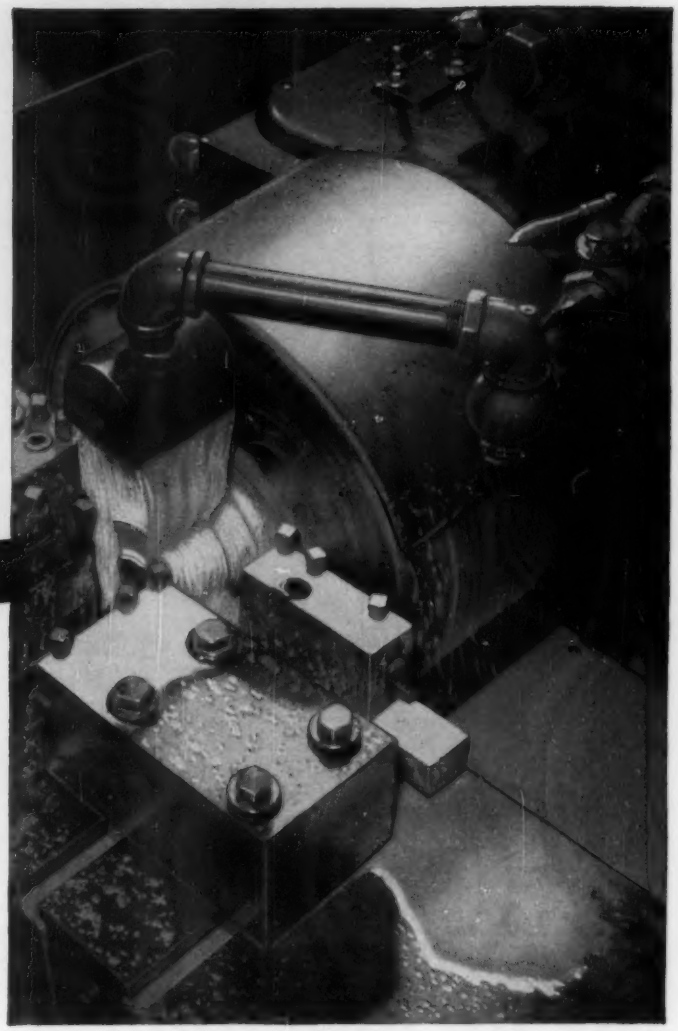
DASCO

SUPER SOLUBLE BASE



THE trial of Dasco in many plants has led to this judgment: Dasco Super Soluble Base is a heavy duty water-mix cutting fluid base of unusual versatility. It gives superior performance in mixtures of 1-40 and higher for turning, boring, reaming, drilling and milling and 1-100 and higher for grinding. Only unusual operations may require richer mixtures

TRIAL 1 OPERATION: Turning complete O. D. Nozzle insert for Rockets, B1117 steel

Dasco Performance: One part Dasco Super Soluble Base and 75 parts water on chucking machines increased tool life approximately 35%. Production increased from 50 to 400 pieces in 8 hours. Tool changes decreased from 27 tools per 8 hours using a competitive soluble oil to 12 tools per 8 hours with Dasco Super Soluble Base.

TRIAL 2 OPERATION: Drilling, counterboring and reaming 90MM Projectiles, A.I.S.I. 1055 forgings

Dasco Performance: Number of pieces per set of tools averaged 250 for a rich mixture of competitive heavy duty soluble oil. A 1-20 mixture of Dasco Super Soluble Base produced 500 pieces per set of tools.

TRIAL 3 OPERATION: Internal grinding of steel ring
Machine: Bryant Internal Grinder

Dasco Performance: A 1-150 mixture of Dasco Super Soluble Base replaced a 1-80 mixture of a competitive soluble oil. In addition the competitive product required a rust preventative. Dasco, even at the long dilution, has been in the machine over a month: no rusting has been experienced.

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THE ONE-MAN-GANG

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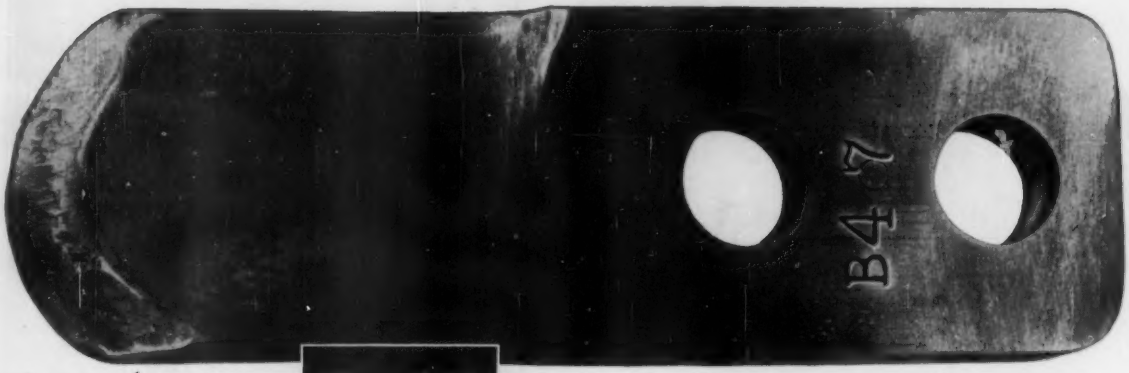
Denmark and that the one who hired such a freak should have his head examined. Can you imagine the workers putting up with such a leader!

I had occasion one time to see a new foreman take over the shop where I worked and all the fellow did was to stand behind his tall desk and dish out the jobs as the men came to him. As far as I could detect, he might have had no shop experience at all, but from the important look on his face, he either put up a pretty good bluff or was a hell of a good foreman. Needless to say he got the work out and didn't lose any time in telling a man that he spent too much time on the job, if such was the case.

On another occasion our foreman spent his time sitting down at his desk, with his back toward us. Once in a while he would swirl around quickly to see how things were going. The time of swirling was so variable that one never knew when he would be caught doing something out of the way. That, I think, was my very first lesson in the psychological value of uncertainty. It was on that job that I received my first yellow slip (fired without any ifs, ands, or buts—just told to get the hell out!). An operator on the next Hendy from mine furtively annoyed me by flinging chips at my carbon-filament electric lamp that hung down just in front of my face. I was chasing a thread on an 8/32 tap at the time with a solid-forged goose-neck tool, and was considerably annoyed at his devilish persistence. Running out of patience, I took my benchbrush by the handle and flicked it to him with no gentle speed. The result was a hell of an explosion as my brush caught his electric bulb broadside. The foreman jumped about six inches from his swivel chair and made a speedy right-about-face, lost no time in giving me a verbal dressing down and handing me a discharge slip.

"Since I ground ten thousandths off the plug gage we haven't had a bit of reamer trouble."



This punch gave double service!

This block had double life!

This die lasted 50% longer!

B-47 HOT WORK STEEL

gives you more runs for your money

. . . anywhere from **1½** *to* **5** *times the Performance!*

SOME TYPICAL EXAMPLES

B-47 dummy blocks, vs. 9% and 12% tungsten types, extruded more than twice as many brass and copper tubes. B-47 dies outperformed 12% tungsten type 1½ to 1.

B-47 punches, vs. low-carbon 18-4-1 type, hot pierced more than twice as many eyes in steel axes. See top picture.

B-47 die inserts, vs. 9% tungsten types, hot pressed more than twice as many steel side gear forgings. B-47 die inserts, vs. regular insert material, performed better than 5 to 1.

B-47 dummy blocks, vs. 5% tungsten-5% chromium types, extruded twice as many copper and brass tubes and rods. B-47 dies outperformed 12% tungsten-12% chromium type.

B-47 punches, vs. 5% chromium type, hot extrusion forged 1½ times as many automotive steel front axle spindles.

B-47 die inserts, vs. 9% tungsten types, extruded 1½ times as many high alloy steel automotive valves. This is considered a very difficult job for any grade of hot work steel.

Looking for a better hot work steel? You'll find it in B-47—an improved chromium, tungsten, cobalt, vanadium type whose superiority is established by actual performance runs such as those summarized above. All tests show that B-47 has unusual resistance to shock and abrasion at elevated temperatures.

Developed originally for applications in the copper and brass industry, B-47 has given excellent results on difficult hot work jobs on steel. B-47, when properly heat treated, exhibits a well rounded combination of red hardness, toughness, and resistance to wear and heat checking that makes it a valuable addition to the Allegheny Ludlum group of hot die steels.

Put B-47 to the test. You'll find that it will do any number of severe hot work jobs without washing out or changing size. Get in touch with A-L, today. Let us help you to use B-47.

● *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

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This four-page folder gives technical data on B-47 for brass extrusion dummy block and dies, valve extrusion die inserts, hot punch tools, forging die inserts, press forging dies, and hot work in general. *Write for your copy today.*

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Spline Shaft

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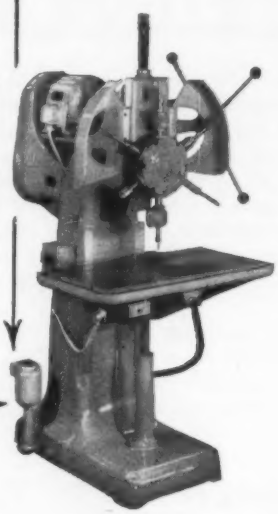

Illustrated is a Burgmaster Drill equipped with a Gusher Coolant Pump. Photo, courtesy Burg Tool Co.

THE RUTHMAN MACHINERY CO.
1818 Reading Road, Cincinnati, Ohio

That was the last brush I ever threw.

One super-energetic shop boss of my acquaintance would go around the shop and take over in some job while the operator looked on. He had a peculiar habit of shouldering the operator to one side and grabbing the necessary handles before apprising the fellow of his intentions—a sort of good-fellowship nudge with extra force behind it! This chap would jump around from machine to machine and proceed to show the operator how to do the job better. One chap couldn't take such actions on a foreman's part and made his displeasure known by throwing his calipers in his toolbox and strutting out without saying a word — who could blame the guy!

Some of the fellows would benefit by the foreman's showing of skill while others would only be bored by his actions. From my viewpoint, this demonstration of skill is unnecessary and contrary to sound executive practice.

A shop executive is a director and has no need of doing work, manually. In the event that a man takes over a shop—a man who is not acquainted with certain machines—he shouldn't lose any time in acquainting himself with the many details so as to have them available at some time of need. This knowledge may come in handy or it may not. However, if his men become aware of the fact that he isn't a practical man, there's hell a'poppin and no one can blame the poppers.

John Homewood
Tujunga, Calif

TO BE SUCCESSFUL in the field of industrial supervision, one must have some mechanical aptitudes and technical abilities, and above all, must be skillful in the art of human relationships.

The question is asked, "Where can the line be drawn between the successful leader and the average foreman?" In the first place, there are

"Invigorating out here in the shop this morning, eh, fellows?"

NOW— NEMA Type XII

THE ONLY SAFETY SWITCH IN SPECIAL INDUSTRY ENCLOSURE!

CAPTIVE SCREWS assure tight cover fit

EXTERNAL MOUNTING FEET eliminate need for conventional leaky mounting holes within the enclosure

NEOPRENE GASKET provides positive cover seal

WELDED TIGHT ENCLOSURE without knockouts excludes dirt, dust, oil, and splashing coolant

This new heavy duty switch, built to NEMA XII specifications, is "tailor-made" for applications requiring the exclusion of dirt, dust, oil and coolant.

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LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS

four basic requisites which can be used as a yardstick in the appraisal of modern foremanship. They are as follows:

1. The ability to meet established production schedules.
2. The faculty for maintaining good labor relations.
3. The ability to control scrap losses.
4. Operating within the budget established for the department.

To meet the qualifications as set forth is not an easy task. Such an accomplishment goes beyond the scope of any one man; group action is required—the efforts of every individual within a department. To obtain group effort requires a foreman who is well liked, one who is able to organize and who is able to gage the aptitudes of his employees, and place them in jobs related to those skills.

There is no doubt that a foreman who can handle every piece of equipment in his department is to be respected. However, one pitfall in such situations exists. He may be spending too much time acquiring and maintaining such skills, causing him to lose control of the steering wheel.

A few years ago I set down on paper my impressions of the industrial foreman, and kept those thoughts on my desk. I thought that in writing these few remarks pertaining to supervision it might be fitting to add them to this script.

My conception of an industrial supervisor revolves around a man who leads the activities of a group of people, whose first consideration is that he will uphold and respect the inherent dignity associated with the human body and soul.

He will exercise tolerance because he understands that the human race is not without faults. He will attempt to guide those who fail frequently in fulfilling their responsibilities, and

"Oh, things are a bit tighter — you notice he's down to cigarets."

will have the courage to exercise the necessary disciplinary measures toward those who will not accept guidance.

Peter L Budwitz
New Britain, Conn

•

SALARY NO SECRET

Should a man's earnings be his private business? Will public knowledge of each worker's wages quiet curiosity or tend to arouse resentment among the men? Some readers say . . .

IT SEEMS TO ME that salary secrets are largely imaginary holdovers from the days when each shop man could make his individual bargain with the boss. But how long was it before any secret bargain "leaked" through the bookkeeper, the paymaster, or some clerk in the office?

We all knew that apprentices started at five cents an hour, when they were paid at all, and had a fifty-cent-a-week raise every six months. We knew the going rate for machinists was from twenty to thirty cents an hour, the lower figure being prevalent in some of the biggest shops in the country many years ago. Toolmakers usually rated the higher figure, but not always. Of course if you had married the boss's daughter you might get a special pay envelope on the side, but even this was hardly a secret for very long.

One of the main objections of the oldtime machinist to joining unions, and his boss as well, was that every one knew the hourly rate for his grade of work. There were, of course, all kinds of ways of slipping a favorite man an extra bonus —but this seldom remained really secret for very long. The favored one was likely to take one drink too many and get into a boasting mood.

One shop owner I knew during World War I had a way of slipping an extra-fast man twenty-five or even fifty dollars when he thought no one was looking. He was making a killing on war work and wanted to make it worth while for the men to stick to their jobs and not take too much time off for ball games or picnics.

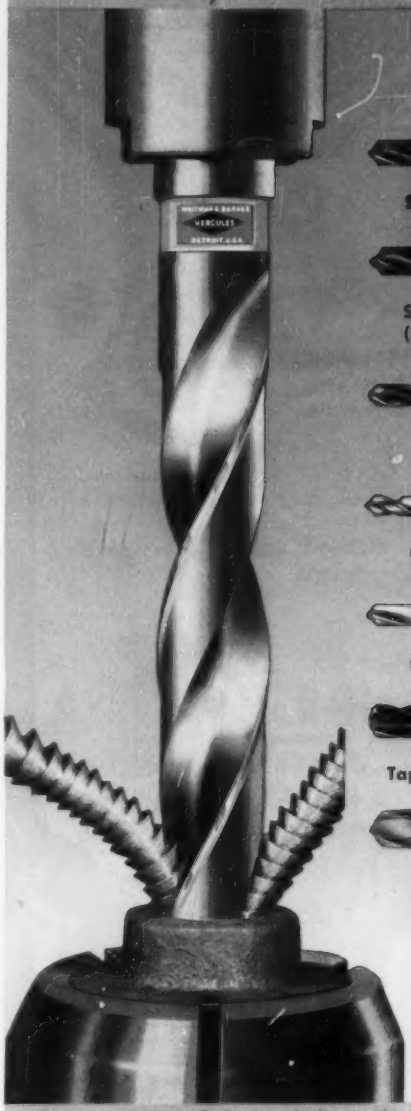
In piecework shops it was never easy to hide what each man made. I knew one case, also during the first World War, when a Gisholt operator was such a wizard that he could make more than double the average output on the war work he was on. No other man in the shop could touch him, and he made very high wages.

The boss didn't kick at all. He was

THINGS TO COME

Future Whitman and Barnes ads will feature examples of cutting tools such as drills, reamers, carbide tools, etc., in actual usage in major industrial plants. Thus you will be able to see how others, by applying W&B quality of tool design and manufacture, have successfully solved their tooling problems, increased production, secured longer tool life, obtained greater accuracy of cutting and substantially reduced tooling costs.

Contact your local W. & B. distributor



Shown below are but a few of the many quality high speed drills to be found in the complete W&B line

Hercules High Speed
Straight Shank Taper Length Drill

Hercules High Speed
Straight Shank Taper Length Drill
(Heavy Duty—Extra Length Flutes)

Hercules High Speed
Straight Shank Jobbers' Drill

Hercules Fastwist
High Speed Straight Shank Drill

Hercules Slowtwist
High Speed Straight Shank Drill

Hercules High Speed
Taper Shank Three Groove Core Drill

Hercules High Speed
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Countersinks · Carbide Tools
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to Investigate the Qualities of

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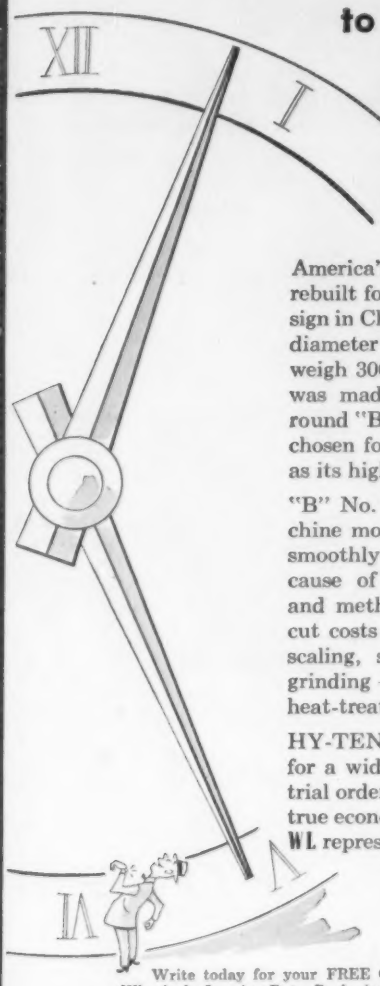

America's largest clock was recently rebuilt for a spectacular illuminated sign in Chicago. It measures 50 ft. in diameter — hands and movement weigh 3000 lbs. The new driveshaft was made from 6 ft. of 3½-inch round "B" No. 3X heat-treated bar, chosen for its machinability as well as its high physical properties.

"B" No. 3X heat-treated bars machine more readily and finish more smoothly than standard alloys because of their particular analysis and method of manufacture. They cut costs by eliminating distortion, scaling, straightening — and often grinding — as well as the cost of heat-treating finished parts.

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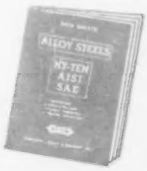
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BILLETS AND FORGINGS FOR PRODUCTION, TOOL ROOM AND MAINTENANCE REQUIREMENTS

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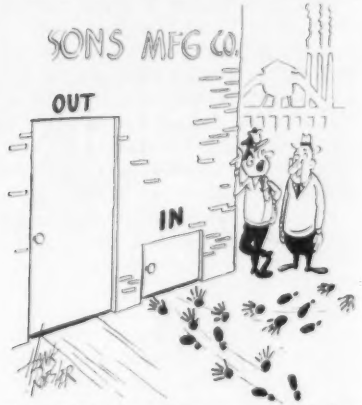
far-sighted enough to see that he was getting a much larger return from his machine tool investment in that particular machine. His machine overhead was lowered and he was happy. But the other men in the shop got together and demanded that their rate be raised above the experts, or his rate cut. They could not bear to think of one man being so much better than the average. Else they threatened to quit the job as there were plenty of others available.

Of course this was a very unjust demand, but the boss felt he had to have production and asked the wizard if he could cut his rate to make the other men happy.

For a wonder the wizard consented to a reduced rate that satisfied the other men but still gave him the biggest pay envelope in the shop. It is, of course, possible that the boss made some outside deal that compensated him for his loss in wages. But if so, it never leaked into the shop. This is simply cited to show that there are mighty few shops where wage rates are a secret whether they are published on the bulletin board or not.

This was the reverse on one of Fred Taylor's proposals as an addition to his piece-rate system. Taylor proposed an increased piece rate after a man had reached the normal output for the day. It was a sound proposal based on the increased output lowering the machine overhead on that machine. Employers did not take to it any more than the men, which was short-sighted on their part; they only looked at the size of the pay envelope. While many of us did not agree with Taylor's ideas as to handling men in the shop, this shows that he really wanted to play fairly with the men.

Many of us may like to feel that we are worth more and getting more pay than the man next to us, believing we earn it. But when most



"You ought to see these guys crawl in here mornings."

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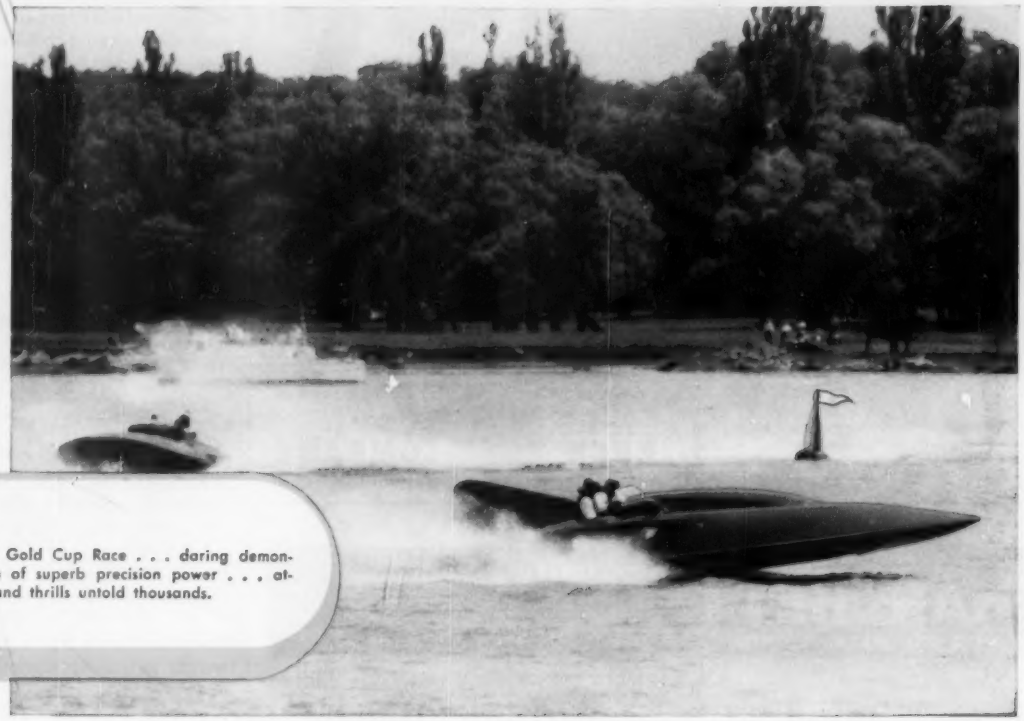

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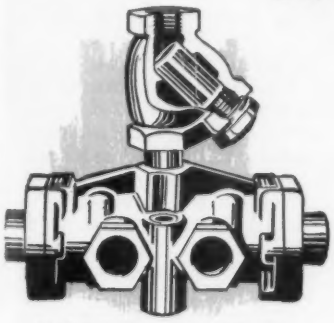

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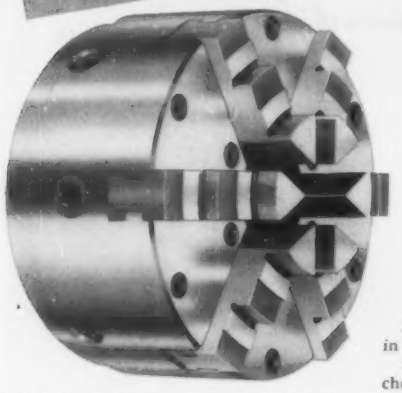

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3-jaw and 6-jaw models in 4", 5", 6", 7½", and 9" sizes. 2-jaw Aviation chucks, for holding odd shaped parts in 6", 7½, and 9".

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MODEL AK

SPEEDS — *10' to 100' 30' to 150' and faster.*
MOTORS — *7½hp. to 40 hp.*
WEIGHTS — *10 tons up to 40 tons.*
CAPACITY — *84" to 360" and longer.*
Mechanical or hydraulic head carriage drive for flat or concave bevel grinding.

Other Models. **GK — medium heavy duty** — *capacity 32" to 184"*
DN — normal production — *capacity 32" to 108"*

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MAIN OFFICE — Big Rapids, Michigan WEST COAST — Portland, Oregon

shop men are now paid at rates set by conferences between union leaders and management bosses, why kid ourselves that there is anything secret about it?

High-salaried men are seldom able to hide the size of their income from the men in the shop. Annual reports of large companies give the salaries of their officers in many cases, as well as the bonuses they receive, which many of us probably feel are too large. We can all know what every Army and Navy man draws per year, from the buck private up to the top brass. We know the president's salary and that of all public officers. Just why should shop men be so touchy about other men knowing how much is in their pay envelope? In fact most of them know anyhow.

If men would worry more about making themselves worth more, either in the amount of production or in ideas which help both the product and the consumer or user, they would be worth more, and would get more in most cases.

Frank C Hudson
Newark, N J

MEDDLIN' MANAGERS

What's the best way to handle the executive who delights in puttering around the shop, particularly during a heavy-schedule run? Is patient attention the answer or will tactful hints do the trick?

I'LL PUT UP WITH a manager who wants to tinker around the shop—one who knows the value of minding his own business, but to have to tolerate some meddling ass, a supercritical executive who raises the blood pressure of everyone whom he comes in contact with, is another story.

I had the misfortune to encounter one of these shop headaches recently as I started in on a new job. Inasmuch as there had been a period of ten years since I had worked as a draftsman, I felt it no more than shooting square with my new chief to tell him that I probably wouldn't set the world on fire, but if given a chance, I could fill the bill eventually. This was appreciated by him as he felt that my broad experience as a shop man would more than repay for the slipping of the wheels at the start. I wasn't on the job but a few hours, getting acquainted with the basic preliminaries peculiar to all plants when this meddling big shot from the front office arrived at the board. "What're you working on?" he asked. (Not "How're you making out," or

"Do you think you'll make the grade" as any employer would greet a new worker). "Sorta getting used to the atmosphere," I replied. "Humph!" he snorted and went about his business. Needless to say this visit—this unconventional visit—was not conducive to good will, and in due time I let him have it with both barrels and told him what I thought of his treatment of new employees.

Unfortunately business slackened and I, being one of the last to be taken on—and what is more to the point, I had incurred the "high mockemuck's" displeasure by giving him a mental left hook—was one of the few to be laid off. In informing me that he was forced to let me go, the engineer confided that he had had great hopes of my fitting in as a valuable man, but economic necessity made it imperative that they cut down expenses. We had quite a chat before I left and I asked him what his reaction was to the manager butting into things as he did. He finally confided "It places me in a rather embarrassing situation to have him injecting himself into things that are entirely within my territory, but I suppose it will simmer down in time."

The man's mistaken; it'll never simmer down so long as he tolerates the practice carried on by the meddling manager. He, in my opinion, is remiss in his duties in not having it out with the man and putting him in his place. It may cause hard feelings for a while and may result in his losing his job. The hard feelings will eventually wear out and if worse comes to worst he will be better off under a manager who knows his place and directs things from the front office.

The last place I had charge of a department was under the management of a gentleman by the name of "Blitz." Blitz dropped around my

"Operator, I'd like to trace that call my husband just made from the plant!"

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NELCO TOOLS

For that Extra EDGE in Production

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

toolroom almost every day and took a leisurely stroll among the men. Contrary to the case of his meddling highness referred to above, Blitz gained the respect of all the men and every one of them agreed that he pointed out many valuable ideas on the work at hand. After making his rounds he confided in me on the many things he encountered when visiting the workers and we talked over things in a constructive way.

Contrast in managerial meddling was evident. Here we have two situations relative to meddling managers: one visits his "underlings," in the guise of a little tin god who thinks he knows everything worth knowing and by so doing affects his workers adversely while old Blitz used a constructive approach, got a hell of a kick out of it while doing it, and laid up potential loyalty for a later date when he needed the workers' support.

Frank Van Horn
Auburn, Calif

I WISH I KNEW how large Ed's and Al's shop is in this case and what they produce. Then it would be easier to solve some of the problems involved.

Assuming 300 or 400 hands are employed and that production is mixed, gives a point to start from.

Some managers in small or large shops think it is their duty to follow up every detailed issue, otherwise they are afraid it won't be correctly executed. But this is entirely wrong. Admitting that a manager, or perhaps the owner himself, in a small shop say of 100 hands, must follow up many details, it is not a manager's duty in the larger shops to do so.

I have met many managers during my years as an executive in the machine building industry, and if I should make any comments on their duties, I could point out several things they shouldn't have done and others they ought to have attended to. One point, however, which I think

"I haven't time to gab with you, boss, I'm late as it is."

IS YOUR JOB HARD TO HANDLE?

LOOK AT WHAT ONE HYSTER JOB-ATTACHMENT CAN DO

REVOLVING LOAD-GRAB

SCOOP, FOR LOOSE MATERIALS

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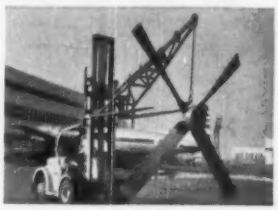

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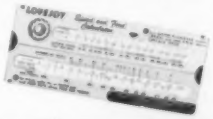
For standard or special cutters, call on Lovejoy—suppliers to the world's leading manufacturers for over 35 years. Write today for Catalog No. 28 which describes the full line of Lovejoy tools.

"Speed & Feed Calculator" free on request



128 MAIN ST., SPRINGFIELD, VERMONT

LOVEJOY TOOL COMPANY, INC.

is common to all of them, is that they should as their first consideration pay attention to principles, and secondly, or perhaps never, meddle with details.

The consequences resulting from managers meddling with details are not only that they thereby hinder many things to be done, but also that this ruins the foremen's interest in their duties. How can a foreman give an order if he is not sure the manager will uphold it? Suppose the manager changes a foreman's order, what respect will the men after that have for the foreman?

Some managers think they are experts on methods, tools, and handling of men, even if they never really practiced such activities. Most of them have technical education as their merit and others have worked themselves up through the shop. Rarely have they both technical education and practical experience.

Here are a few data on the background of managers I have had personal experience with. One had a university technical education but was very weak as an administrator; of working methods, tools, psychology and discipline he knew nothing. To make up for his deficiencies he associated himself with one of the foremen in the shop whom he asked about everything that should be done. On the recommendation of this foreman he bought many machines that turned out to be a total loss to his company, and he gave orders that lowered the efficiency in the shop. Yet the director, misled by the manager, upheld most of his inefficient efforts.

In another case an accountant with no technical education nor practical experience, was promoted to manager in a small shop on the single merit that he could bawl people out. It is easy to understand what kind

"Carrying lunch is not like eating at home . . . I miss the coffee cup to put my cigaret ashes in."

of administration existed in a shop with that type of manager.

In one case a bank director owned a small shop where conveyor rollers were made. He made it a duty to meddle with every detail he ran across in the shop, and here is a typical example of what might happen when technical ignorance and real experience meet in a discussion:

Director: I don't like these rollers; they are too sloppy in the bearings.

Engineer: If the ball bearings must be tighter, it is necessary to grind the races so that a better precision is obtained.

Director: No, that makes them too expensive. The bicycle shop across the street never grinds the races in their bearings and they have made good bicycles for 25 years.

Engineer: Yes, but those bearings are turned prior to hardening while our races are pressed of sheet metal.

Director: Well, the rollers must have tighter bearings. See to it that they are better made but don't grind them!

In this case it would have made no difference if the bearings were made a little sloppy. I imagine the discussion is still going on.

An engineer suggested recently that if machine shops were to be run efficiently, the foremen should have the right to select their manager instead of the other way, in which case they would see that they didn't meddle with things which really belong to the shop men.

I don't blame Al for his big frown. If Johnson as manager doesn't have better sense than monkeying with his production, he has good reason to be dissatisfied. But, as Ed points out, it is best to be careful about his resentment. Some managers are very sensitive of criticism and abuse their position just for the purpose of showing who is the boss, and they might fire anyone any time.

If Johnson is interested in what's going on in Al's department, he

"Had an argument with the janitor—I'm waiting for his apology."

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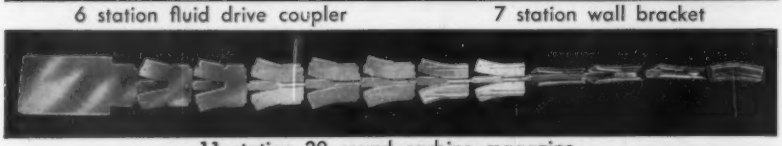

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should ask Al about it, and never give any orders to anyone but him. No wonder Al gets nervous. He might get the idea from this meddling that the manager is dissatisfied with him, and preparing him for the scrap heap.

Meddling with production and showing interest in it are two different things. Any manager must have a great interest in what's going on in the shop, but decency demands that his interest should be governed by accepted disciplinary rules. For the manager to go playing golf or visit cocktail parties during working hours is equally wrong as meddling with Al's production.

If Johnson wants to relax, he had better go to the country club rather than messing with production. It is not fair play to meddle with anybody's duties.

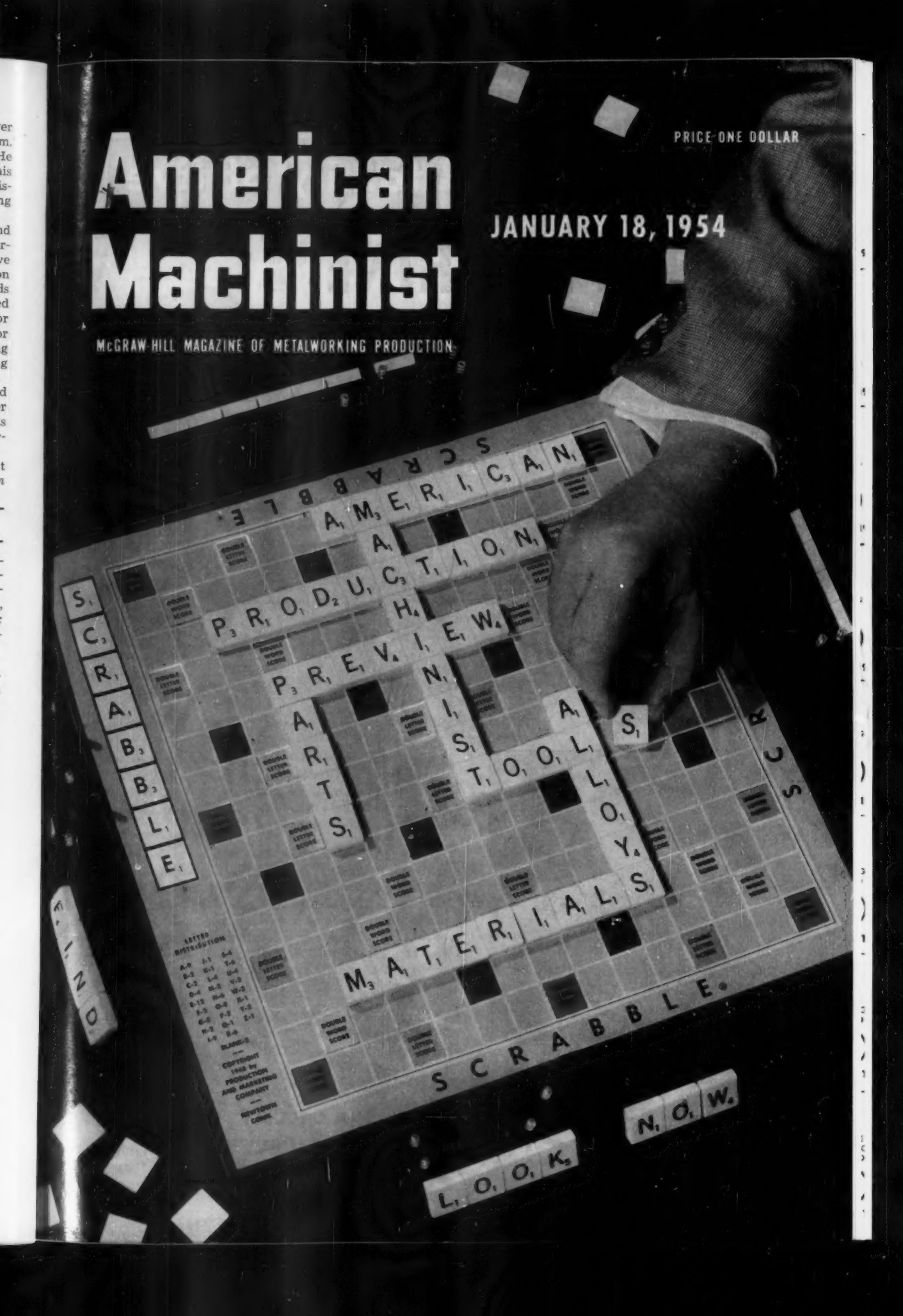
A E Fristedt
Stockholm-Bromma, Sweden

NEW BOOKS

RECRUITING THE COLLEGE GRADUATE—*By Richard S Uhrbrock. Published by the American Management Association, 330 W 42nd St, New York 36, N Y. 32 pages, 6 x 9, paper-bound. Price, $1.25, nonmembers; $1, members.*

This is a valuable guide to the problem of recruiting college graduates for industrial work. Written clearly and concisely, the booklet describes several phases of the hiring process, as seen from the viewpoint of the interviewer. Included are sections on campus interviewing, including rating charts for this procedure; second-stage interviewing on company premises, with a complete transcript of a sample interview; area interviewing, which outlines responsibilities of various departments as they talk to the prospective worker; and a rather extensive bibliography of books and articles on the subject of the interview.

Although this booklet is written as a guide for the interviewer, anyone thinking of being interviewed for a job would do well to study this manual, to learn what factors are significant in the course of the interview. Although this may seem unfair to the interviewer (to know what he is about) it is a subject which has received far too little attention in some colleges, with the result that worthwhile job applicants can trap themselves through ignorance of the facts of corporation life, and fail to be hired, even though suitable for the job.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